British Society for the Study of Orthodontics 1937

TRANSACTIONS
OF THE
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1937

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"JENNY."

Reproduced by courtesy of Capt. A. W. F. Fuller from original paintings of two natives by T. Bock, about 1837.

"JEMMY."

The British Society for the Study of Orthodontics

Malocclusion in the TASMANIAN ABORIGINES*

By F. St. J. Steadman, D.P.H., M.R.C.S., L.R.C.P., L.D.S.

For a long time past the ætiology of malocclusion has interested me and, looking through the proceedings of our Society, I find that ætiology has occupied our attention to a considerable extent, in which we were encouraged by words used by our first President, Mr. J. H. Badcock, in his Inaugural Address in the year 1908. He said: "In the region of ætiology, pathology and prophylaxis, we are still lamentably ignorant. It is our earnest hope that we may be able to attract into our Society scientific workers in other specialities and that, labouring together in the wide fields of biology, embryology, physiology, ethnology, we may advance the science of orthodontia as our American confrères have advanced art."

Nevertheless, it must be confessed that we are still as ignorant—or almost as ignorant—to-day as we were then. Indeed, the list of known causes of malocclusion seems to be growing shorter and shorter as the years go by. This indicates, it is true, some advance in knowledge, but it has not, so far, taken us much nearer the solution of our problem of understanding the many causes underlying malocclusion.

Some thirty years ago heredity was the peg upon which we used to hang all our theories with which we cloaked—or tried to cloak—our ignorance. But after this theory had been for some years more or less discarded, it has recently shown a tendency to come into its own again. We now recognise that heredity does play an important part in the production of some forms of malocclusion.

I think Northcroft's illuminating Dental Board Lecture in 1924, in which he showed that postnormal occlusion was already present

* Presidential Address to the Society, 1937.

and well marked *in utero,* was a definite but rather staggering advance in our knowledge. To my mind it emphasises the difficulty we have in treating the condition successfully. It shows that the forces against us are of much deeper origin than some of us had previously imagined.

For myself, I have felt for some time past that what is needed is a rather wider outlook than we have taken hitherto in trying to find the cause for much of our malocclusion. I think we want to study environment more carefully, because we know that external influences and mode of life will, in many instances, profoundly modify normal occlusion and arch relationship.

The diet upon which we live has a considerable effect by causing caries on the one hand and periodontal disease on the other. Both these factors, as we know, can and do produce malocclusion.

Some time ago, in turning over the matter in my mind, I thought it would be fruitful for us to examine a number of Neolithic skulls, to see what story they had to tell. But I could think of no series of skulls of sufficient number, of the same race, and living at the same time, which would make such an investigation worth while. It is true that there were a good many Anglo-Saxon skulls found in a cemetery at Bidford-on-Avon. These, many of which I have seen, were not ancient, for they belonged to civilised man, being no further back than the sixth century. Then it occurred to me that possibly we might get some information from the Tasmanian aborigines, a Palæolithic race.

I then set about making inquiries as to what skulls were available for examination, and where they were to be found. Since then I have studied the habits, customs, and environment of the Tasmanian people in the literature published about the time of their final extermination in 1876, in the belief that environment might have played an important part in the production of malocclusion. These Tasmanian aborigines are of an extraordinary interest. Tasmania (a triangular island with an area of 24,331 square miles, being 200 miles from north to south and 245 miles from east to west) was separated from the mainland of Australia by the foundering of Bass's Strait in the late Pliocene or early Pleistocene times, probably round about a million years ago.

The Strait is about 200 miles broad in the widest part, but this distance is considerably reduced by various islands but never so much as to make it possible for the Tasmanians to cross, with their primitive knowledge and power of navigation, to the mainland. The aborigines had, therefore, been isolated from the rest of the world for countless ages, and when found in 1772 they were still in the Palæolithic age. We have here a race which was living under the most primitive conditions, and it seems well worth while to examine in some detail what these conditions were, and then turn to the skulls.

The Tasmanian race differs from all other known races. It is true that they somewhat resemble the Australian aborigines, but they are distinguished from them by the character of their hair, which is finely curled or "woolly," and also by the peculiarities of the cranium, especially its characteristic width in the parietal region.

A Tasmanian skull is so characteristic that it can be readily distinguished from all others. This probably arises from their long isolation, their habitat being completely out of the track of commerce and civilisation, and their having no means of navigating the seas around them.

Authorities differ as to the origin of the race. Some hold the view that the Tasmanians wandered down the east side of Australia and eventually crossed the land-bridge to Tasmania when they were caught by the subsidence. Professor Huxley, however, considered that it was physically impossible that the Tasmanians could have come from Australia ; and apparently the only way of accounting for their presence was to assume migration from New Caledonia and the neighbouring islands. It would appear that at one time a low Negrito type spread eastwards and reached Tasmania, not by means of direct and uninterrupted land communication between New Caledonia and Tasmania, but rather by means of broken land in the forms of a chain of islands now submerged, similar to that which at present extends between New Caledonia and New Guinea. The colour of the skin of the natives was a dark brown, like that of the Papuan race, but to the Europeans who first met them, they appeared considerably darker, owing to their habit of blackening their skin with charcoal.

As to their number, this is a matter of speculation. According to G. A. Robinson —one of the early settlers —their number in 1804 was about 7,000 or 8,000 ; but other authorities consider that this estimate is much too high, as thirty-three years later, when the remnant was removed to Flinders Island, they only numbered 123 ; and as we hear of no very great mortality among them during this period, it is probable that this was not correct. They certainly did not number much more than 2,000, which about fits in with the size of the island. It would probably have been difficult for a much larger population than 2,000 to obtain a living, as they were hunters, and hunters require a large tract of country to support them. The first sight of Europeans of and contact with the natives occurred in 1772, when a Frenchman (Marion de Fresne) came to anchorage in Frederick-Henry Bay. An armed party landed without opposition ; the natives came forward without reluctance. Both men and women were stark naked, as they had not learned the art of using a needle, nor even to make a stitch of any kind. Since that date there were several landings on the island. Captain Furneaux, of the British man-of-war "Adventure," landed in 1773 ; Cook in 1777 ; Blyth in 1788 and, again, in 1792. In the same year, D'Entrecasteaux, the French navigator, landed. In 1792 Bass proved that Van Diemen's Land (the original name of Tasmania) was an island. In 1803, Lieutenant Bowen was sent by Governor King, of New South Wales, to form a settlement of the south coast of the island. From these various contacts with the natives a good deal of their mode of life is known to us.

They were nomads, wandering from place to place ; their practice was to encamp for the night on the spot where they had their last meal. They were entirely naked, except when occasionally some of the women wore kangaroo skins over their shoulders to aid them

in carrying their children. It was a matter of surprise to the Europeans that these savages could withstand the cold climate at night under these conditions. They had little knowledge of hut-building; the few huts found were exceedingly crude, and in most cases not even rain-proof. They were apparently only intended for a few days' sojourn, although rather more substantial huts, a few together, were found on the west coast. They usually only erected exceedingly rude wind-screens under which they sheltered from the severe gales which sweep the island. They knew nothing about cultivation of the soil. Their only weapons, as hunters, were the spear, about six to twelve feet long, pointed at one end, and the "waddie." As evidence of their skill, Lloyd, one of the original settlers, has the following graphic description of a hunt :—

> "When but a boy I passed many happy days in following the chase with those primitive children of the wood, who took great delight in teaching me to wield the quivering spear and whistling waddie. . . . The method of capturing the forest kangaroo . . . was exceedingly interesting and exciting. On sighting their prey, the most skilful hunter instantly dropped to the earth and creeping alternately on hands, knees and stomach, behind trees and stumps . . . now insinuating his supple body through the high grass like a wily snake, until he had successfully arrived within thirty or forty yards of the unwary victim, he would carefully raise himself up behind the trunk of a tree presenting a best point of attack when poising the fatal weapon, he bounded towards his prey with the agility of a panther, and hurling his spear seldom failed in transfixing the poor animals. Their mode of hunting in the ferns, scrubs, and underwood was by clearing a patch of about twenty feet square. Men, women and children then distributed themselves in a large circle, and advancing towards the cleared space, drove the game—brush, kangaroo, wallaby, bandicoot—indiscriminately to the slaughter."

They had not learned to snare animals, but they made the hunting of them easier by setting fire to the brushwood from time to time and place to place. They had not learned to trap animals by use of a pit, so they had to rely entirely upon the spear and waddie, nor had they learned the use of the boomerang or the bow and arrow. They lived on the animals they could kill—the kangaroo, wallaby, opossum, bandicoot, squirrels, rats and birds, etc. Curiously enough, they had not even learned the art of fishing. They were not known to eat any scaled fish, although the rivers and shores of the sea teemed with them. They did, at times, spear fish, but for sport only. They ate a quantity of haliotis, lobsters, crayfish, mussels, and oysters. The women were expert swimmers and could remain under water in the search of oysters for a much longer time than could their European observers. The natives also ate a variety of plants and seaweeds which abounded on their island, making use of fern roots, sea-weeds, fungi, etc. The sea-wrack (*Fucus palmatus*), they broiled and when softened to a certain point, tore to pieces to eat.

Up to the time of the settlement they apparently had no knowledge

of boiling water. Indeed, they had no utensils in which to boil it, the art of pottery being entirely unknown to them. A large portion of their sustenance was obtained from the native bread, a fungus growing near the roots of trees ; also, they ate mushrooms and the *Gastrodi sessamoides*, the native potato. They used to eat berries and fruits, the principal being the *Solanum laciniatum* or kangaroo apple. Many of the roots and plants they used to broil or roast. They ate birds and all kinds of birds' eggs. They seemed particularly fond of the flesh of deadly snakes and of the iguana. They also obtained from the cedar trees by the lakes (*Eucalyptus resinifera*) a slightly saccharine liquor resembling treacle. At the proper season they bored holes in the trees from which the sweet juice flowed plentifully.

They knew the use of fire. In 1642 Tasman had seen their fires from his ship. They probably obtained fire by twirling rapidly between the palms of their hands a piece of hard pointed stick, the pointed end being inserted into another piece of dry wood ; but as this seems to have been a somewhat slow process, they carried fire-sticks, a piece of decayed wood, alight at one end, which burned slowly. These fire-sticks they carried with them from place to place. They roasted shell fish. Opossums and other animals they roasted whole. They knew the value of not over-doing the roast, and by the following process they retained all the best of the gravy. As soon as the flames of the fire had burned down, they threw the animals, with their natural coats upon them, on the live embers, occasionally turning them from side to side until all the fur was singed off and the entire carcass tolerably well cooked throughout. It was then taken off, cut up with a large flint or stone, quartered and disjointed. In eating, they rejected the skin of the animal. Only one writer mentions the use of salt, and we appear to have no knowledge as to how they obtained this necessary commodity. It appears that they dipped the flesh into the alkali ashes of the fire as a substitute for salt. They delayed drinking until they had finished eating, when the women and girls were sent to fetch water in vessels made of sea-weed. They did not seem to bother whether the water was clean and fresh, and drank it muddy and stagnant. In contrast with their neighbours in New Zealand and the surrounding islands, they were not cannibals, but they had enormous appetites, due, no doubt, to the fact that they often had to go many hours without food. When they did get a meal they made up for lost time. They used to follow the Roman method of reclining at meals, lying round the fire, resting upon one elbow, hand supporting the head, and holding the half-roasted piece of opossum in the other hand. They were able to draw rough pictures of animals with charcoal, but they had nothing to compare with the beautiful Aurignacian art found in Europe in the Neolithic age. Their boats were of the crudest : little more than rafts only fit to cross a river or go a few cable lengths from the shore when the sea was smooth. These boats were made from the barks of trees, various pieces being held together by cords made of grass.

At first their relations with the white people in many parts of the island were friendly ; but, after the settlement, several unfortunate

misunderstandings took place, which led to a war of extermination, and the remnants of this unfortunate race, numbering about 123 persons, were rounded up and placed, first on Swan Island, and later on Flinders Island. Later still, they were transferred to Oyster Bay. They were kept under wretched conditions and, probably due to the fact that they were unable to wander at will over the land, and also because they were given clothes, they eventually suffered from consumption and other diseases which rapidly exterminated them. The last woman of the race died in 1876. Having thus arrived at some idea of the mode of life and environment of the Tasmanian people, we can turn to examine their jaws and teeth.

Unfortunately, owing to their method of disposal of their dead—which was to burn them—there are only a few Tasmanian skulls in existence. Dr. Garson states that there are not more than about six complete skeletons and not more than seventy skulls. The majority (thirty-seven) of the latter are, fortunately for us, in the Museum of the Royal College of Surgeons of England. There are two more in the Natural History Museum, South Kensington; three in the possession of that well-known collector, Captain A. W. F. Fuller; ten more in the University Museum, Oxford; and one in the Pitt Rivers Museum, Oxford, making fifty-three in this country. There is one more in Edinburgh, and four in Dublin. There are a few more in the Museums of Europe and a few in Australia. Unfortunately a large number of them are much damaged, many having no mandibles and lacking a number of teeth which were lost posthumously.

Before dealing with occlusion, I shall first of all review the amount of periodontal disease and caries which I observed, as both these are undoubted factors in the production of malocclusion. At a first glance at the skulls, I was struck by the immense size of the teeth. They were larger than those of any other known race of man. The next striking fact was the wonderfully well-developed arches in nearly all of them. They were almost entirely free from periodontal disease. Skull after skull showed the alveolar margins normal and without a trace of general disease. There was one notable exception to this (R.C.S.M. No. 1415, pages 240, 241). Unfortunately in this specimen there were a large number of teeth missing (post-mortem). The disease was chiefly in the molar region, apparently brought about by food-packing on the lines so well described by Sir Frank Colyer.

This skull was in such a marked contrast with the other skulls that I wondered whether it could have belonged to an individual who had come under the influence of civilised diet, thus accounting for its condition. I was able, however, through the courtesy of Dr. A. G. E. Cave, to trace the origin of the skull. The subject was a female, aged about thirty, who had apparently lived "wild." The skull was found at St. Mary's. An aboriginal lad had told a Dr. Milligan that his party had, some years before, been fired on by a white man, when a woman was wounded, had her head chopped off, and was buried. Years afterwards, Dr. Milligan took the native to the spot and found the body in the bush, as described. I am afraid the story does not throw much light on the cause of this

woman's periodontal disease. Although this was the only case of generalised disease, several other skulls showed localised alveolar abscesses. Several teeth, especially in the molar region, had been lost before death from this cause.

The cause of these abscesses, in some cases, was the impaction of the upper third molar pressing upon the roots of the second molar, causing its loss by abscess formation. There were four such molar abscesses (two in R.C.S.M. No. 1096, pages 228, 229; one in R.C.S.M. No. 1102, not illustrated; and another in R.C.S.M. No. 1418, pages 243, 244). An abscess was also to be seen in connection with the right upper second premolar following upon trauma of the pulp from attrition (R.C.S.M. No. 1104, not illustrated). Caries was also notable by its rare incidence, as compared with modern man.

	Molars.	Premolars.	Canines.	Incisors.	Total.
	331	186	66	104	687
Caries present	33	9	0	2	44

It is, of course, always difficult to be quite sure whether one is dealing with caries in ancient skulls that have been damaged after death. Some of the teeth showed fissures and cracks in the enamel, which was dark brown in colour and exceedingly hard. These were not considered by me to be caries. I may say that my friend, Mr. F. C. Hatherill, and my son, Mr. B. St. J. Steadman, examined these skulls with me and we were agreed on this point. Most of the caries found was on the occlusal surface and had little bearing on malocclusion. One or two of the cavities were cervical cavities on the distal surfaces of the teeth. In one, a left lower second molar, there was a distal cervical cavity with exposure of the pulp at a point where an impacted crown of the third molar may have caused food to lodge (R.C.S.M. No. 1096, pages 228, 229).

Another very striking feature of the skulls was the marked and almost universal attrition. This attrition had, indeed, in some cases led to the loss of nearly the whole of the occlusal surface of the enamel, especially in the molar regions, and had considerable bearing upon occlusion. In this connection, these skulls were strikingly similar to the Anglo-Saxon skulls examined and described by Miss Smyth in 1933. Another interesting feature was the occasional loss, some time before death, of one or more of the upper incisors. One skull, that of a woman, Bessy Clark, showed the loss of all four upper incisors in this manner. Five other skulls showed the loss of both upper incisors, two the loss of the right upper central incisor and one of the left central incisor: that is to say, nine skulls in fifty-two.

A French naturalist, Labillardière, in his description of the natives in D'Entrecasteaux's expedition in 1771–1773, says: "We noticed some in whom one of the middle teeth of the upper jaw was wanting, and one who lacked both. We could not learn the object of this custom, but it is not general, for the greater number of the people had all their teeth."

In certain aboriginal tribes there is a religious ceremony in which the central upper incisors are knocked out in young boys at the age of puberty, but this custom was not known to be practised among

the Tasmanians, and, as Labillardière says, it certainly was not general. Moreover, the skull in which all four of the central incisors were missing was a female, and these religious rites were never practised upon the female sex. The skull of Bessy Clark (R.C.S.M. No. 1097, pages 230, 231) besides showing the loss of these central incisors, showed distal caries in the right upper second molar, and occlusal caries in the left upper second molar. She was one of the cases of an impacted upper third molar, the left being impacted. In the lower jaw, which was in postnormal occlusion, the third molar on the right side sloped backwards, in a position similar to what we know as a vertical impaction when there is not room for such teeth to erupt. Another mandible also showed the right lower third molar sloping backwards in this manner (R.C.S.M. No. 1418, pages 243, 244).

Bessy Clark was one of the last of the aborigines. She was photographed in 1866 and died in 1869 at the age of about forty. She grew up in the custody of the Catechists, as she was captured as a baby during a fight between whites and blacks, when she was left behind by her mother when escaping, and the baby was brought up among the settlers. Another very remarkable feature was the frequent impaction of the upper third molar and also of the lower third molar. I noticed no fewer than fourteen impacted upper third molars in the thirty-three skulls in which the molar region was sufficiently perfect to enable me to make a diagnosis, and, in the mandible, eight impacted third molars in twenty-one mandibles in the same condition. In one case (R.C.S.M. No. 1418, pages 243, 244) the right upper third molar was actually trying to erupt into the roots of the second molar, causing a severe inflammation all round this tooth and probably having caused the loss of the first molar. In another case—a skull in Captain Fuller's collection—the right upper third molar was pointing horizontally backwards and outwards. This curious malocclusion of the molar teeth, which differs from that of all other kindred races, was noticed by the late Professor Flower in 1878, who remarked on "the tardy development and irregular position of the posterior molars. Their teeth" (he said) "are generally of large size, but there appears to be too little room for them in the jaw, so that only in two, out of the eleven adult skulls in which their condition can be observed, are all of them normally placed; in all the others one or more of the wisdom teeth are either retained beneath the alveoli or are in oblique or irregular positions." Of the fifty-two skulls which I examined there were only eleven with sufficient teeth present to enable me to investigate the arch relationship, and in some of these incisors were missing.

The marked attrition present in nearly all these skulls had an obvious bearing on occlusion. As in the Anglo-Saxon skulls, the occlusal planes were in many cases almost flat, allowing the mandible to slide forward. This forward movement appeared to be well marked in one skull (R.C.S.M. No. 1415, pages 240, 241), but in this the incisors were missing, so that it was impossible to state definitely what their occlusion was. In other cases the mandible did not appear to have moved forward, so far as the arch relationship is concerned (R.C.S.M. No. 1406, pages 238, 239 and N.H.M. No. 1917 : 10.29, not illustrated). In this latter specimen, which was a very fine one, there was crowding and imbrication of

the lower incisors. The occlusion of the left side was normal. There was slight postnormal occlusion on the right side.

There were several other skulls of interest. In one (N.H.M. No. 94 : 1.20:1, page 248), the left upper lateral incisor was missing, and there was a crowding and imbrication of the lower incisors and a flattening of both jaws on the left side. The molar occlusion was normal. A very interesting specimen was R.C.S.M. No. 1417, pages 241, 242. The arches were narrow, and the upper central incisors were rotated. As the right one was missing it was difficult to say exactly what its position was. The right lateral incisor was inside the bite. There was a supernumerary tooth behind the left central. The left upper first molar was rotated. In the mandible there was some crowding of the lower incisors and the left third molar was displaced slightly outwards. Another interesting specimen was a young male (R.C.S.M. No. 1099, pages 234, 235) with well-developed arches. Neither of the third molars had as yet erupted. It showed postnormal occlusion. In one well-developed skull, a child, about twelve years of age (R.C.S.M. No. 1111, pages 236, 237), the occlusion in the molar region was normal, but unfortunately several of the teeth were missing.

In the Oxford collection there was a most interesting specimen $\frac{80.}{AUS\ 5}$, page 249. All the teeth were present in these well-developed jaws but the upper arch was V-shaped and the occlusion was nearly normal in the premolar and molar regions (except the right third molars) ; but the upper central incisors were well in advance of the lower, so that they must have protruded over the lower lip. There was the fanning of the lower incisors which is so commonly seen to-day. It is, indeed, interesting to note that the appearance which our European neighbours describe as " rabbit mouth "—a deformity which they commonly associate with the British people, and which has been considered by some of our anthropologists to be a recent development—should be found in this ancient race.

Another interesting specimen among the Oxford collection was $\frac{80.}{AUS\ 1017}$ The premolar and the first and second molar occlusion on both sides was normal and the left upper third molar was unerupted and appeared to be about to erupt through the outer alveolar plate. Both of the lower third molars were impacted. The left upper lateral incisor was biting well inside the lower incisors, and there is no doubt that the three other upper incisors (which, however, were missing), did likewise, in spite of the fact that the molar occlusion was normal.

In another skull (R.C.S.M. No. 1096, pages 228, 229) the upper incisors were also biting inside the lowers, although the molar occlusion was post-normal. The skull in the Pitt Rivers Museum, the jaws and teeth of which I was unable to examine as it was under a glass case, and is not, therefore, included in the fifty-two, was interesting as it had been trepanned on the right side some time before death.

What has this examination revealed to us as to the condition of the teeth and jaws of these ancient palæolithic people ?

In the first place we can picture them as almost free from periodontal disease, and as suffering little from caries. Here and there abscesses appeared, with the usual swollen face. Their jaws were generally well-developed. There was probably a higher standard of normal occlusion in them than in modern man, certainly in those of younger years. In those of later years, owing to attrition the mandible was in some cases able to slide forward, and some of them may have, in consequence, developed edge-to-edge bites. This attrition is commonly found in nomadic peoples. I believe it to be due to their environment—to the fact that they take their meals in the open, so that the wind blows dust and grit and sand into their foods, and that we shall always find this attrition where we find men living under such conditions. Hence this form of malocclusion. We do not find it—or it is at any rate very rare—in modern man, whose food supply is protected from dust. If I am right in this surmise, we ought to find attrition in animals which live under such conditions, and I think we do.

When, during the War, I lived for some time on the Sinai desert, I came across numbers of skulls of animals—especially of dogs—which showed this marked attrition ; and I personally experienced the unpleasantness of grit in the food at every meal. Malocclusion in the molar region is very difficult to account for. It is a megalodont condition. That is to say, the teeth are too big for the jaws, and it is not a case of the jaws being too small to contain the teeth. In several cases there was crowding of the lower incisors. This appears to have been due to the struggle of the big posterior teeth to accommodate themselves in the jaws, because it was not seen in the younger specimens. Such younger specimens were, however, too few in number for any firm conclusions to be based on them. There were one or two cases of bilateral and one case of unilateral postnormal occlusion similar to that so commonly seen in modern man. It is interesting to note that these ancient people sometimes had a missing upper incisor and an occasional supernumerary tooth.

In conclusion : These Tasmanian skulls appear to support our view that modern civilisation, with its sticky, sugary, carbohydrate food, is largely responsible for periodontal disease and for the caries which is so common among us. They appear to show that malocclusion, with the curious exception of the molars, was less common than among us, and that some of the malocclusion from which these people suffered was due to causes which no longer exist with modern man.

My thanks are due to Dr. Beattie and Dr. Cave, of the Royal College of Surgeons' Museum ; to the authorities of the Natural History Museum, South Kensington ; to Dr. L. D. Dudley Buxton, of Oxford University ; to Sir Arthur Keith ; to Captain A. W. F. Fuller for his assistance and for his courtesy in allowing me to photograph his collection of skulls, and to reproduce photographs of two original paintings by T. Bock, about 1837, of two natives ; and to Mr. J. B. Parfitt for his kindness in drawing the arches of some of the skulls with his modification of the camera lucida (described by him in the National Dental Hospital *Gazette*). I have also to

thank Mr. F. C. Hatherill and my son, Mr. B. St. J. Steadman, for assisting me in the examination of the skulls, and Mr. Edwards (Benards & Co.) for his careful and painstaking work of preparing the illustrations.

To anyone wishing for further details about these fascinating people, I recommend the following books :

Books :

"The Aborigines of Tasmania," by H. Ling Roth. (London, 1890.)

"The Last of the Tasmanians," by James Bonwick, F.R.G.S. (London, 1870.)

"Early History of Tasmania," by R. W. Giblin. (London, 1928.)

Articles :

"Comparative Anatomy of Man," by Professor Flower, 1879. (*British Medical Journal.* Page 501.)

"Transactions of the British Society for the Study of Orthodontics," 1933, Smyth, Miss K. C.

EXPLANATION OF SIGNS

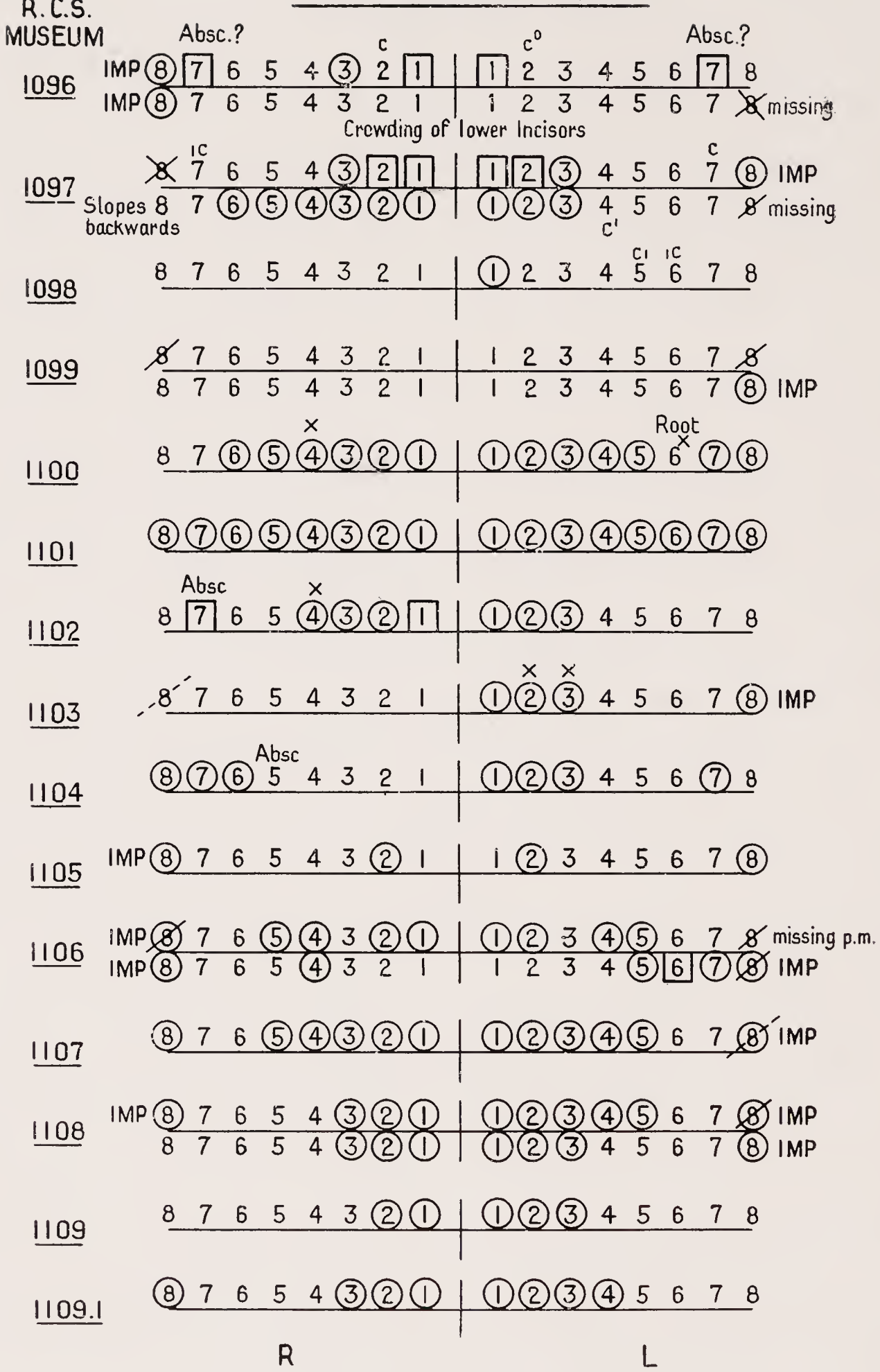
1	=	Tooth lost before death
①	=	Tooth lost after death
8	=	Tooth erupting
×	=	Root
$\overset{o}{C}$	=	Occlusal caries
C_1	=	Distal caries
^1C	=	Mesial caries
IMP.	=	Impaction
V. IMP.	=	Vertical impaction
Absc.	=	Abscess
⎽‾ ‾⎽	=	Prominent incisors
/ ‾ ‾ \	=	Prominent incisors, laterals rotated

When no figures are shown below the horizontal line, the mandible is missing.

The numbers on the left are the Catalogue numbers of the various museums

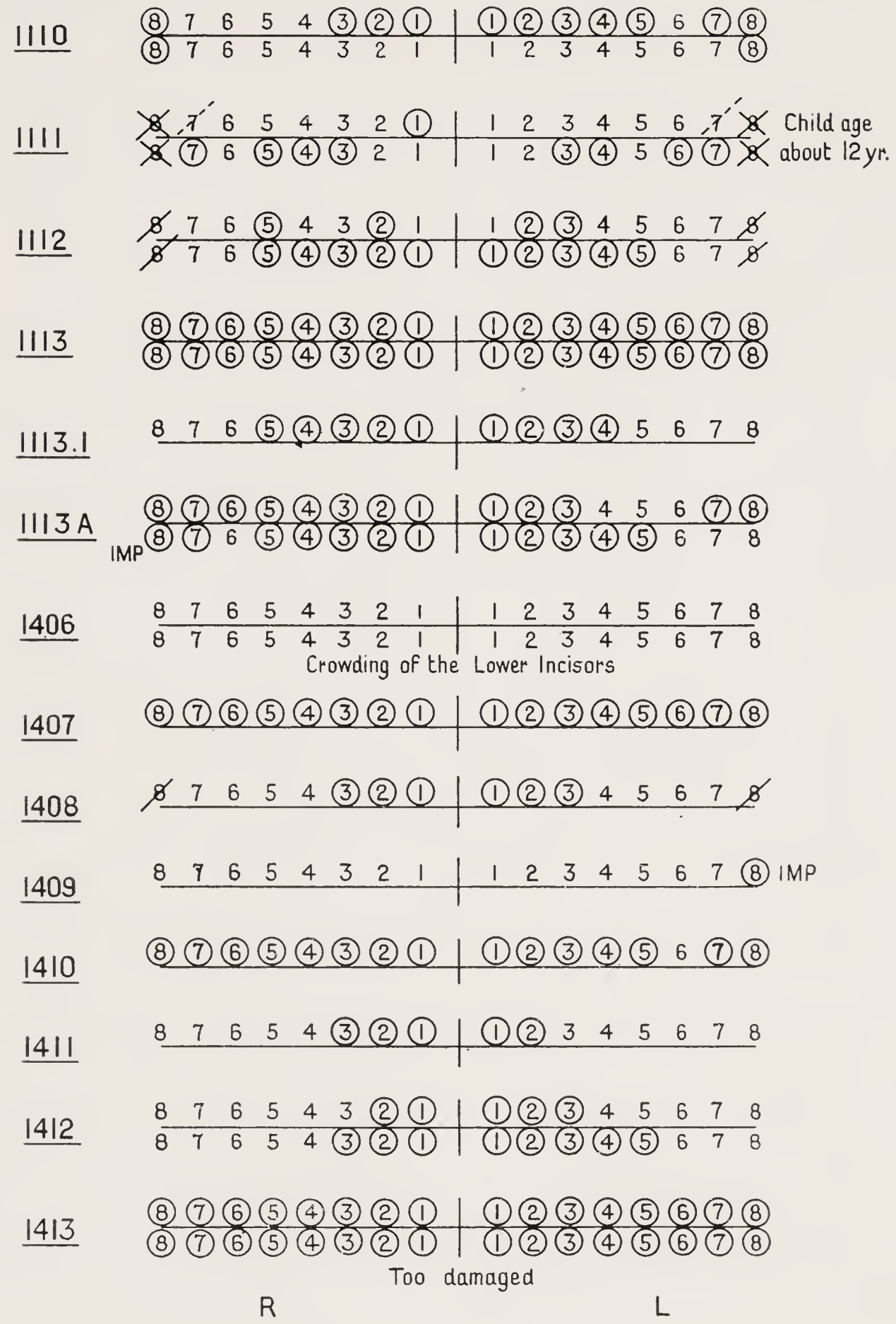
These signs and symbols are used in the charts accompanying the illustrations that follow.

TASMANIAN SKULLS CHART I



R.C.S. MUSEUM

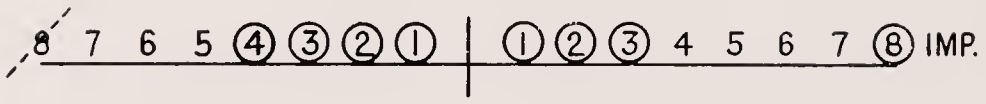
TASMANIAN SKULLS CHART II



TASMANIAN SKULLS CHART. III

R.C.S. MUSEUM

1414



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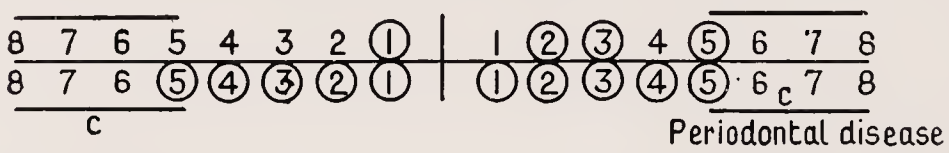

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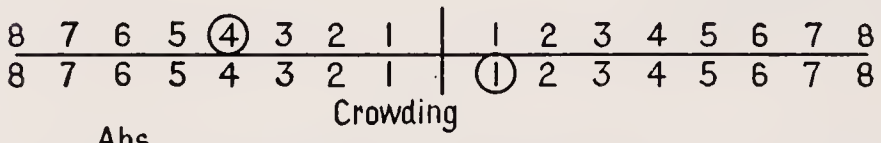

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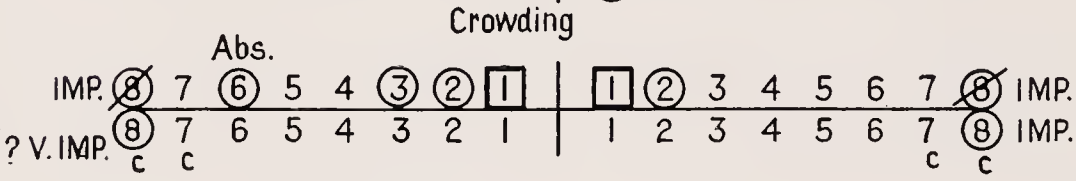

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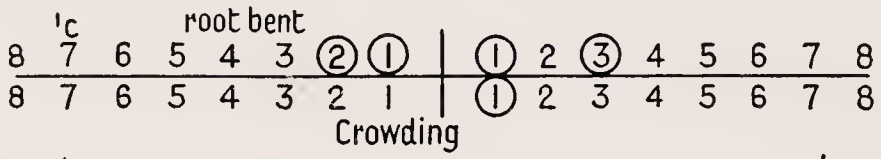

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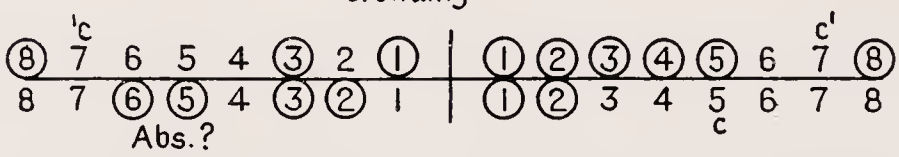

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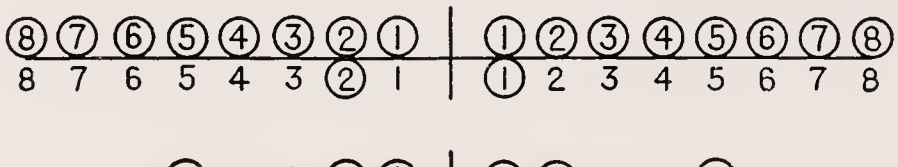

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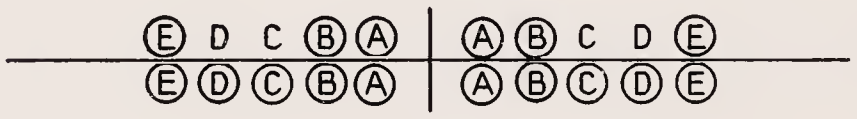
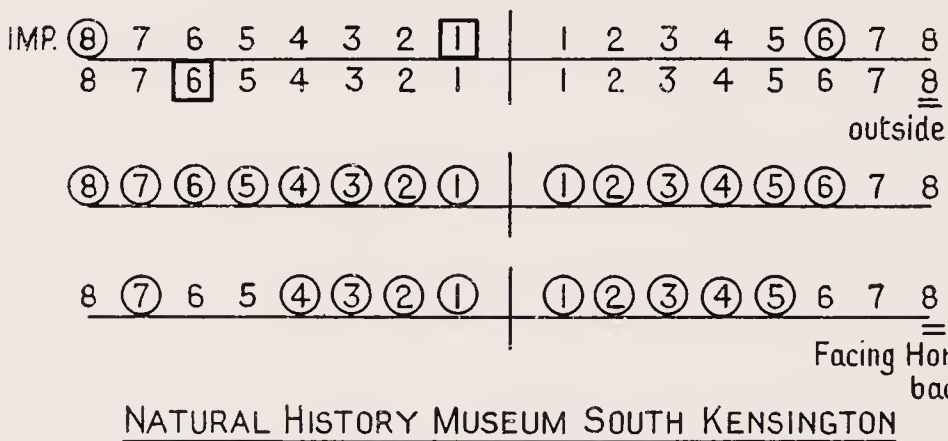
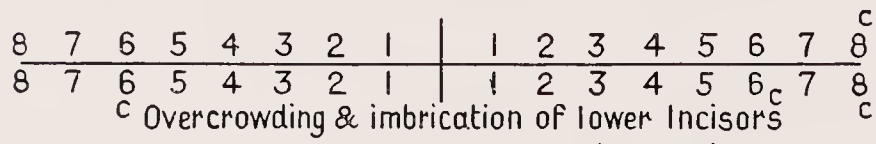


CAPTAIN A.W.F. FULLER'S COLLECTION



NATURAL HISTORY MUSEUM SOUTH KENSINGTON

1917.10.29.1.



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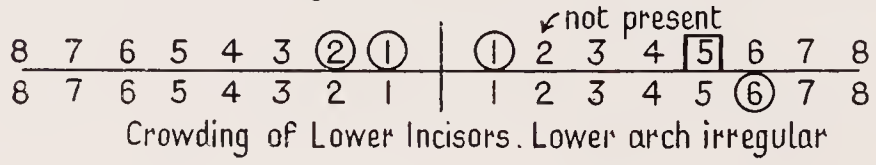
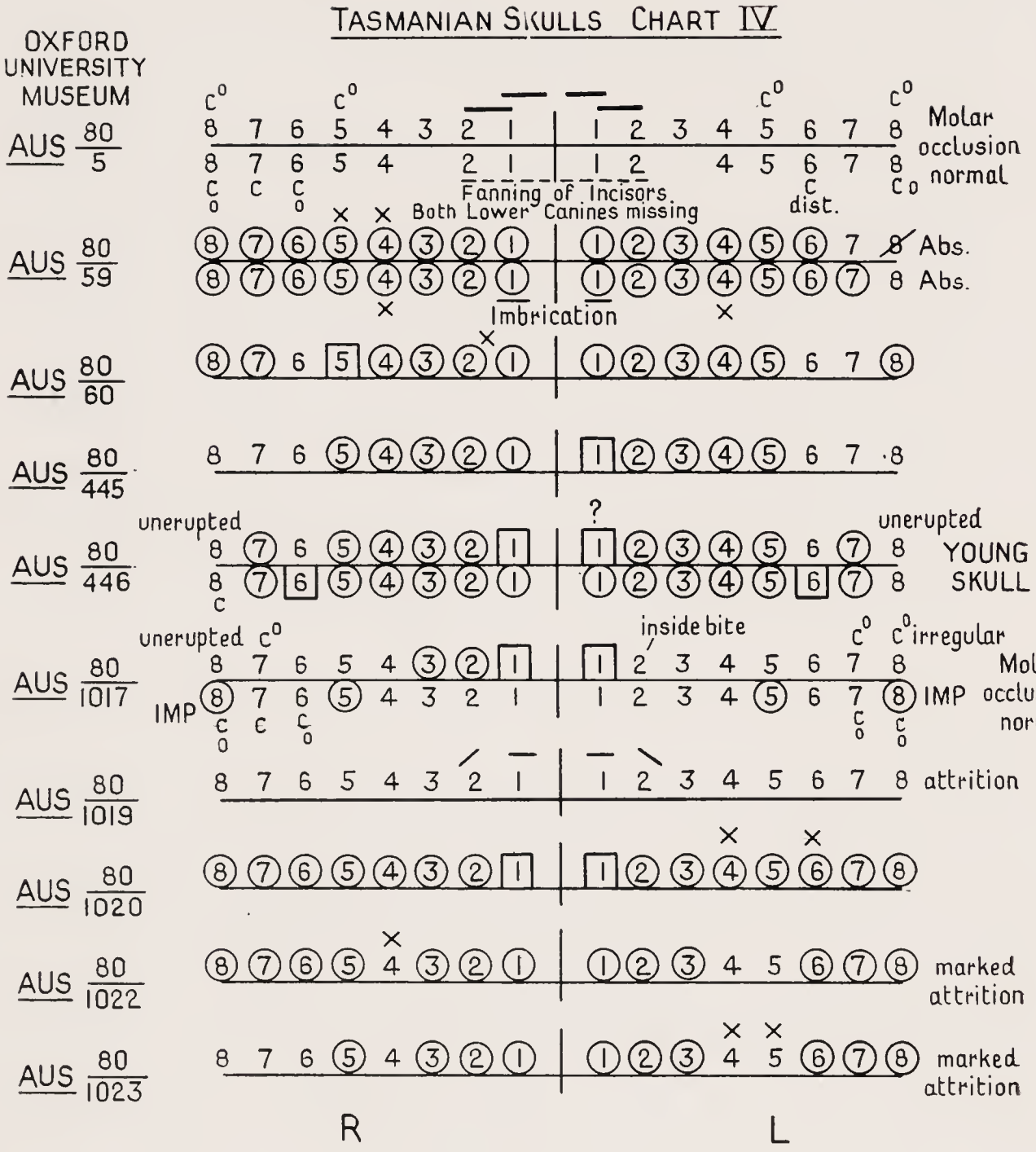
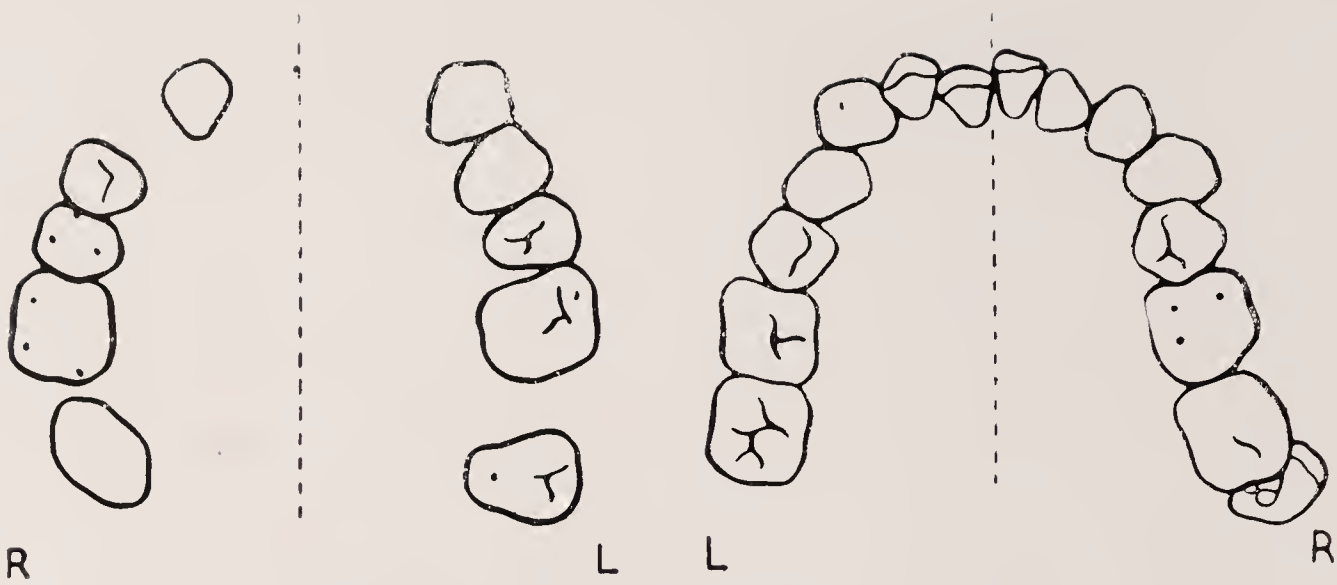


TASMANIAN SKULLS CHART IV





Tasmanian 1096. Two-thirds actual size.

8 Badly impacted only distal surface visible

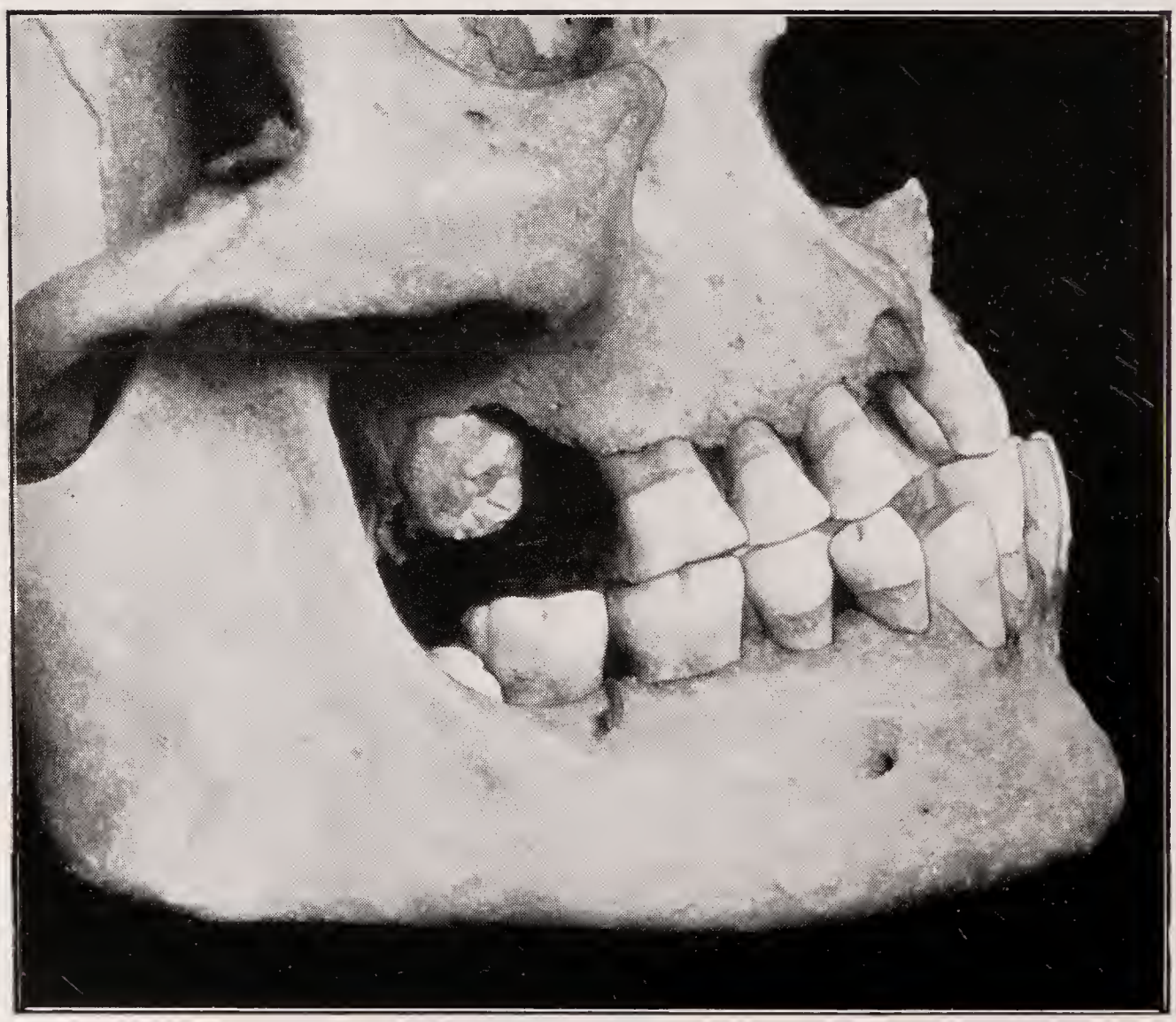
8 Missing

7 Large distal cavity at cervical margin

Abscess on 7

1 | 1 Lost considerable time before death

2 | 2 Carious



R.C.S. 1096. Actual size.

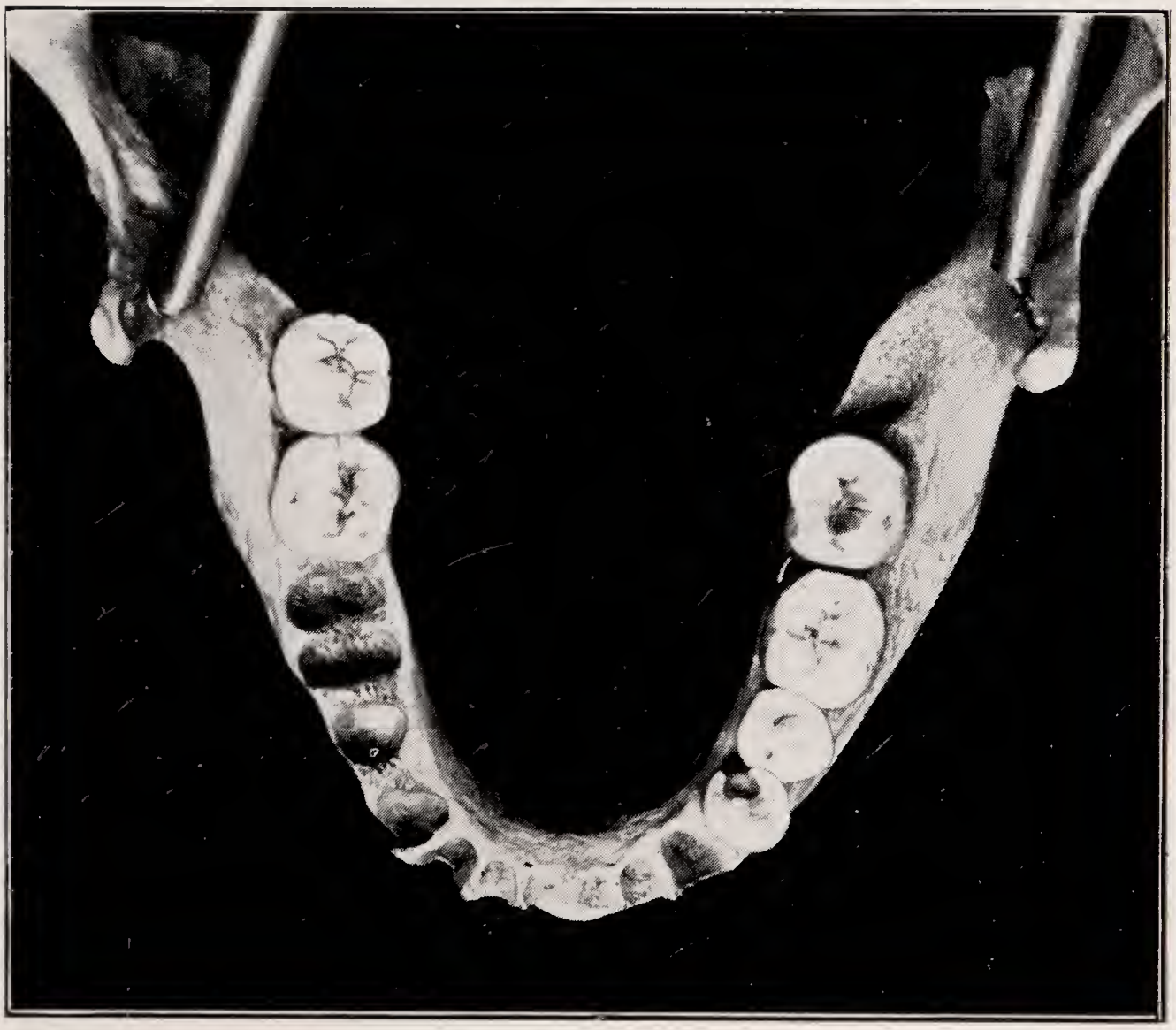
R.C.S. 1096. Actual size.

R.C.S. 1096. Actual size.

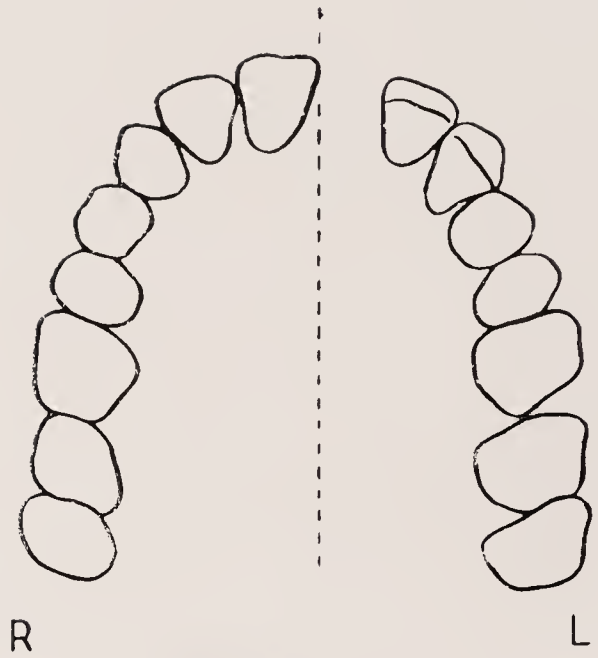
Bessy Clark.
R.C.S. 1097.

R.C.S. 1097. Actual size.

R.C.S. 1097. Actual size.

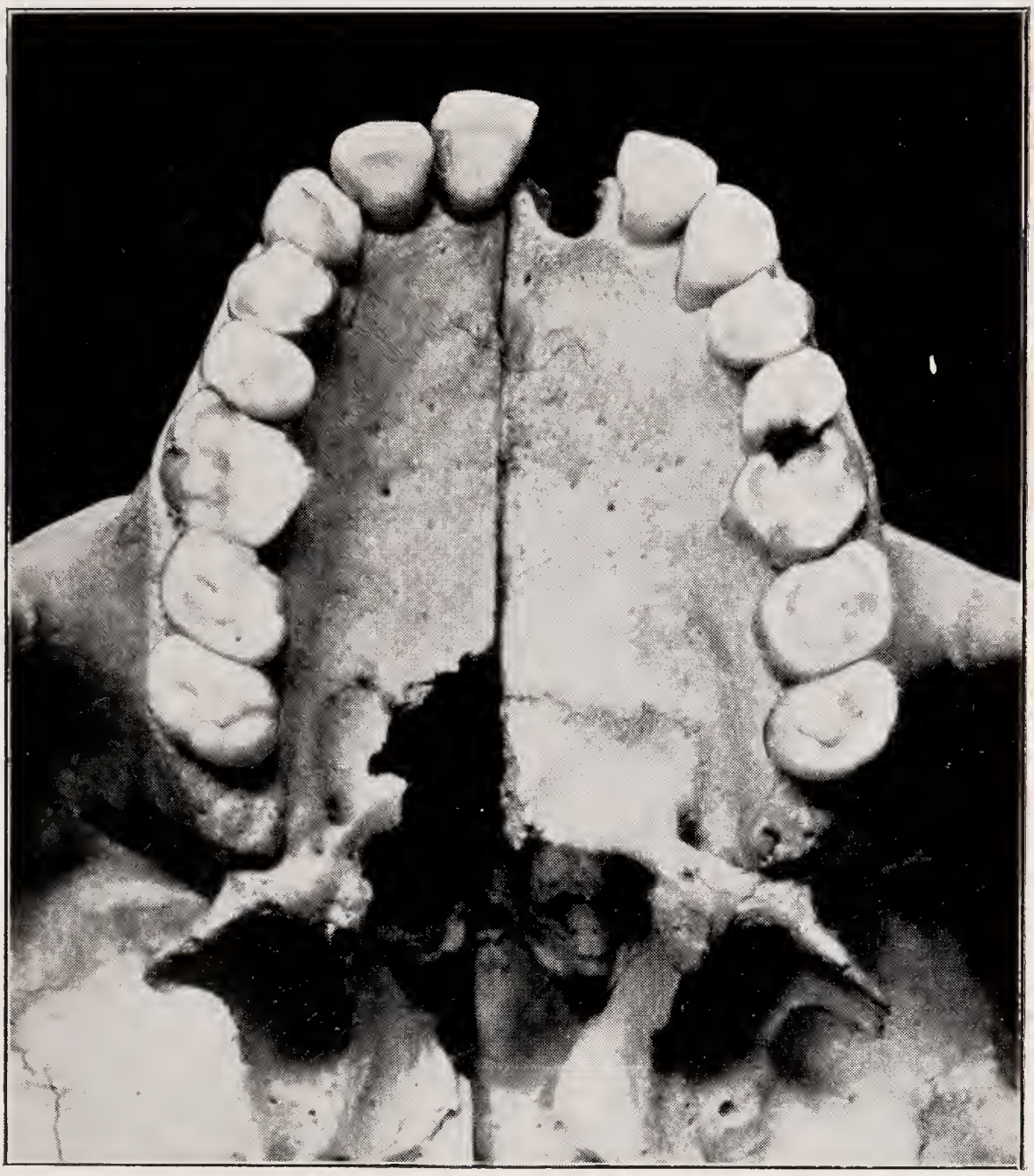


R.C.S. 1097. Actual size.

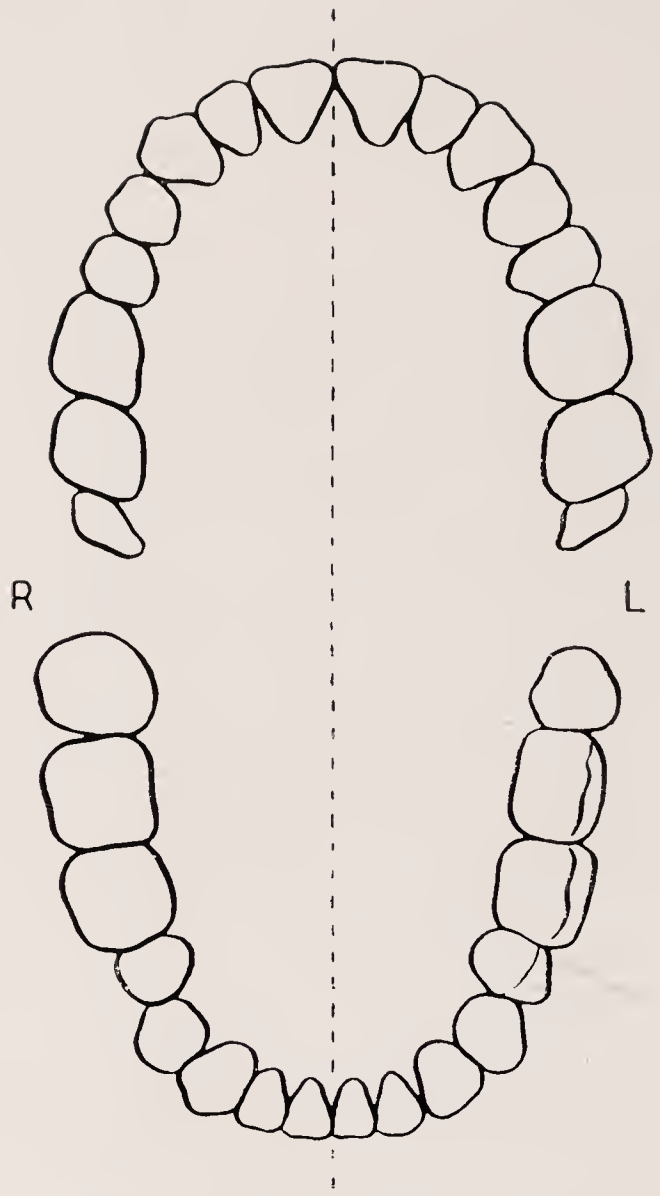


TASMANIAN
Upper jaw only
Nº 1098
Two-thirds actual size.

R.C.S. 1098. Actual size.

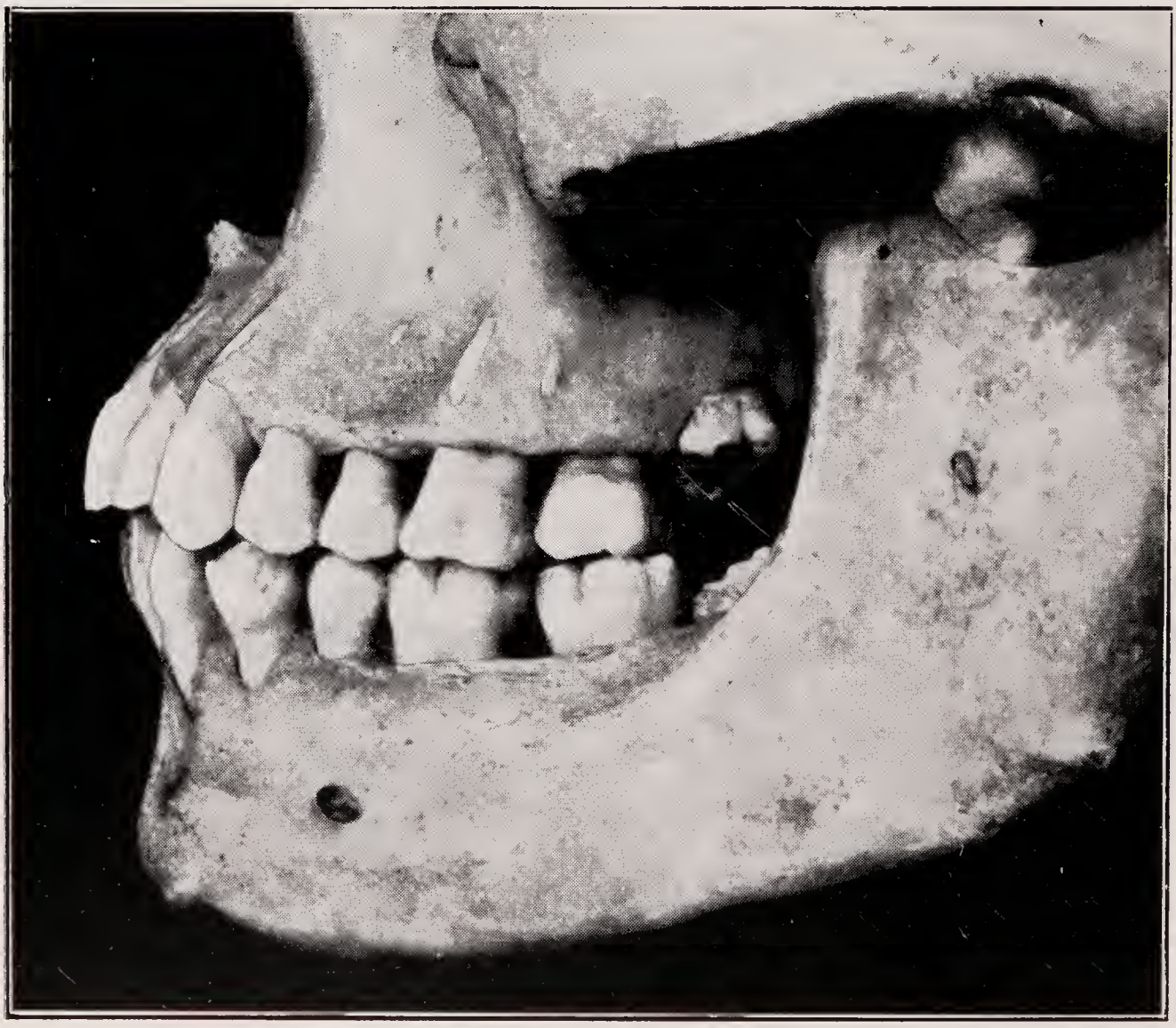


R.C.S. 1098. Actual size.



TASMANIAN ♂
1099
All 3° molars not erupted

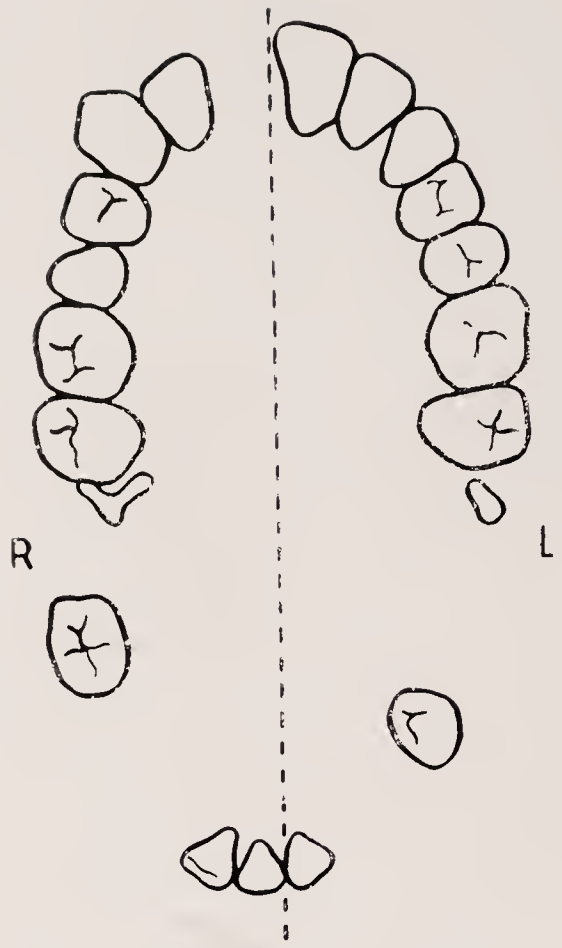
Two-thirds actual size.



R.C.S. 1099. Actual size.

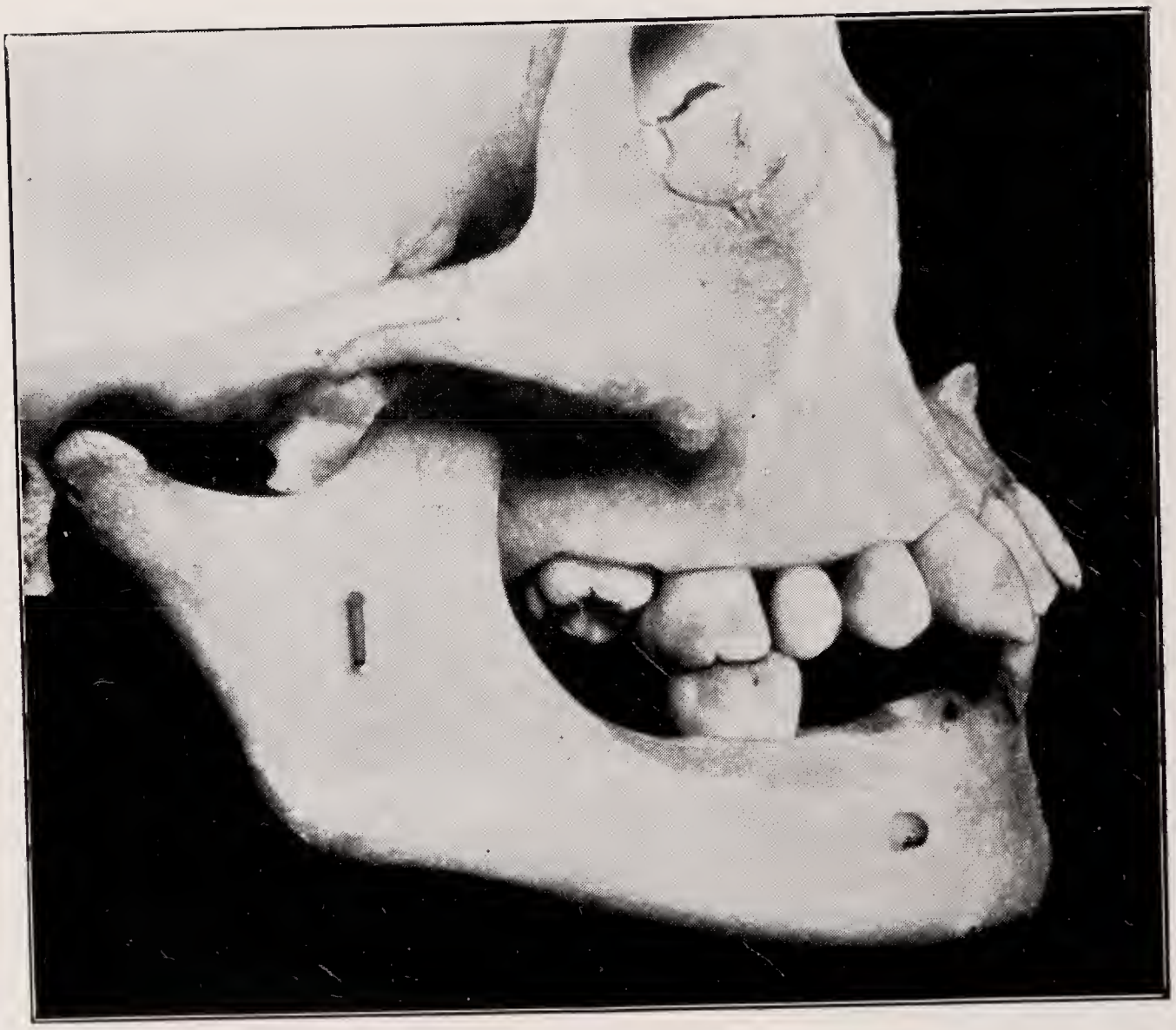
R.C.S. 1099. Actual size.

R.C.S. 1099. Actual size.



Two-thirds actual size.

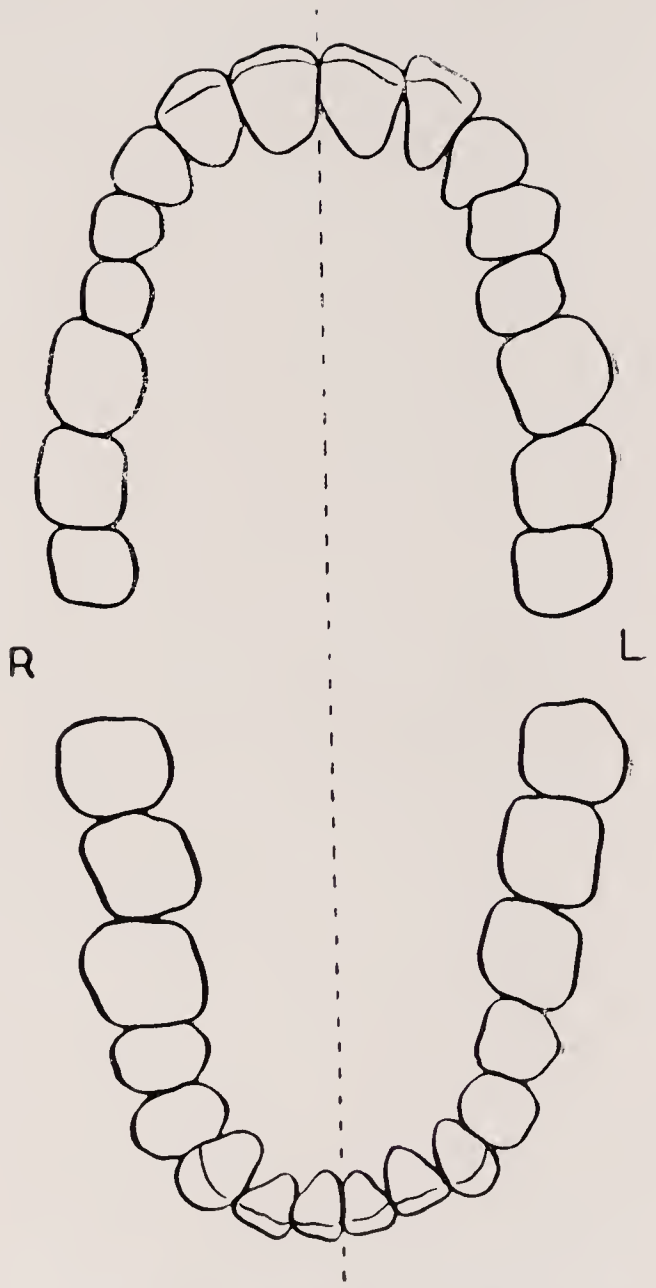
TASMANIAN IIII
♂ aet. 12



R.C.S. 1111. Actual size.

R.C.S. 1111. Actual size.

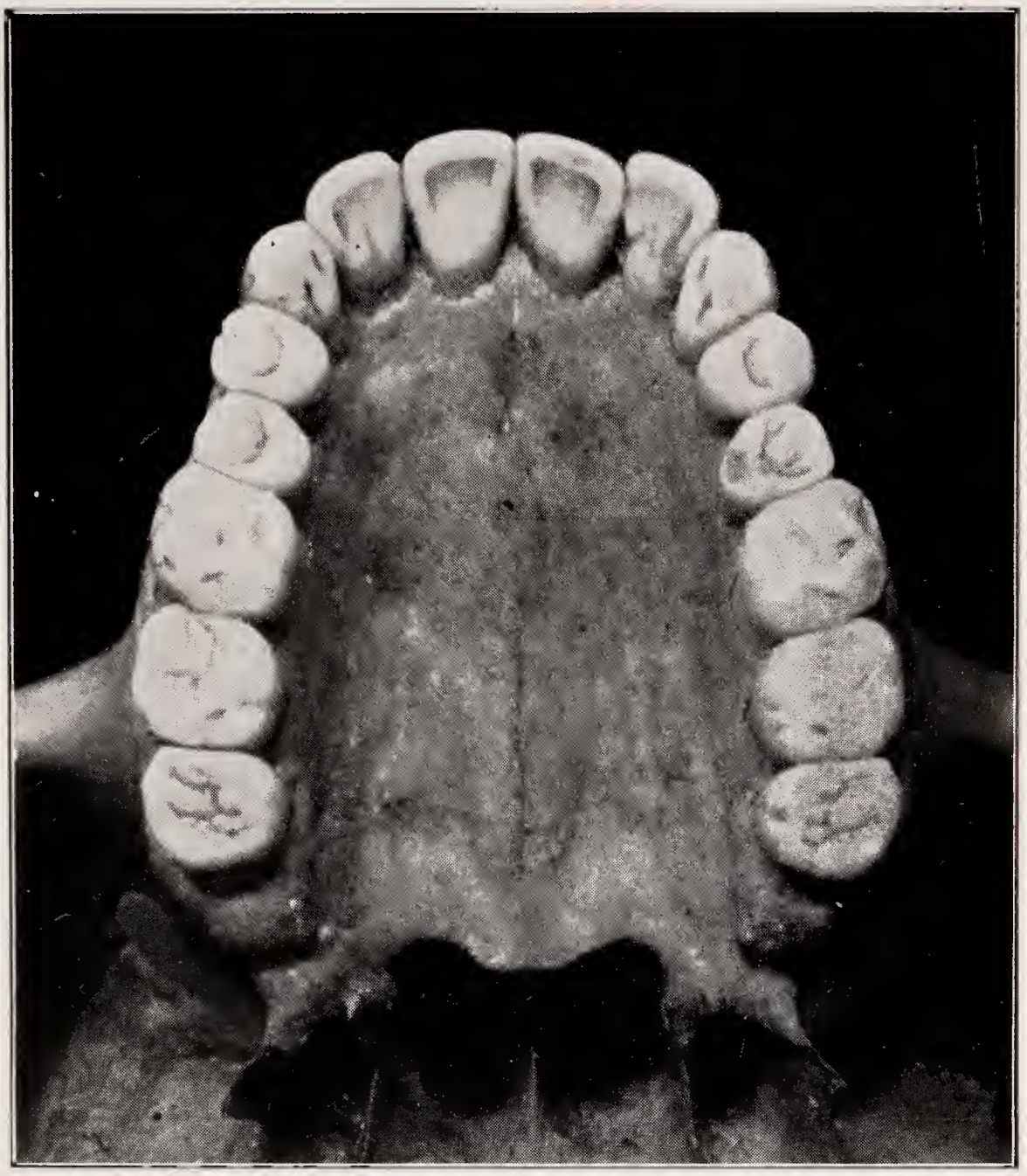
R.C.S. 1111. Actual size.



Two-thirds actual size.

TASMANIAN 1406

R.C.S. 1406. Actual size.



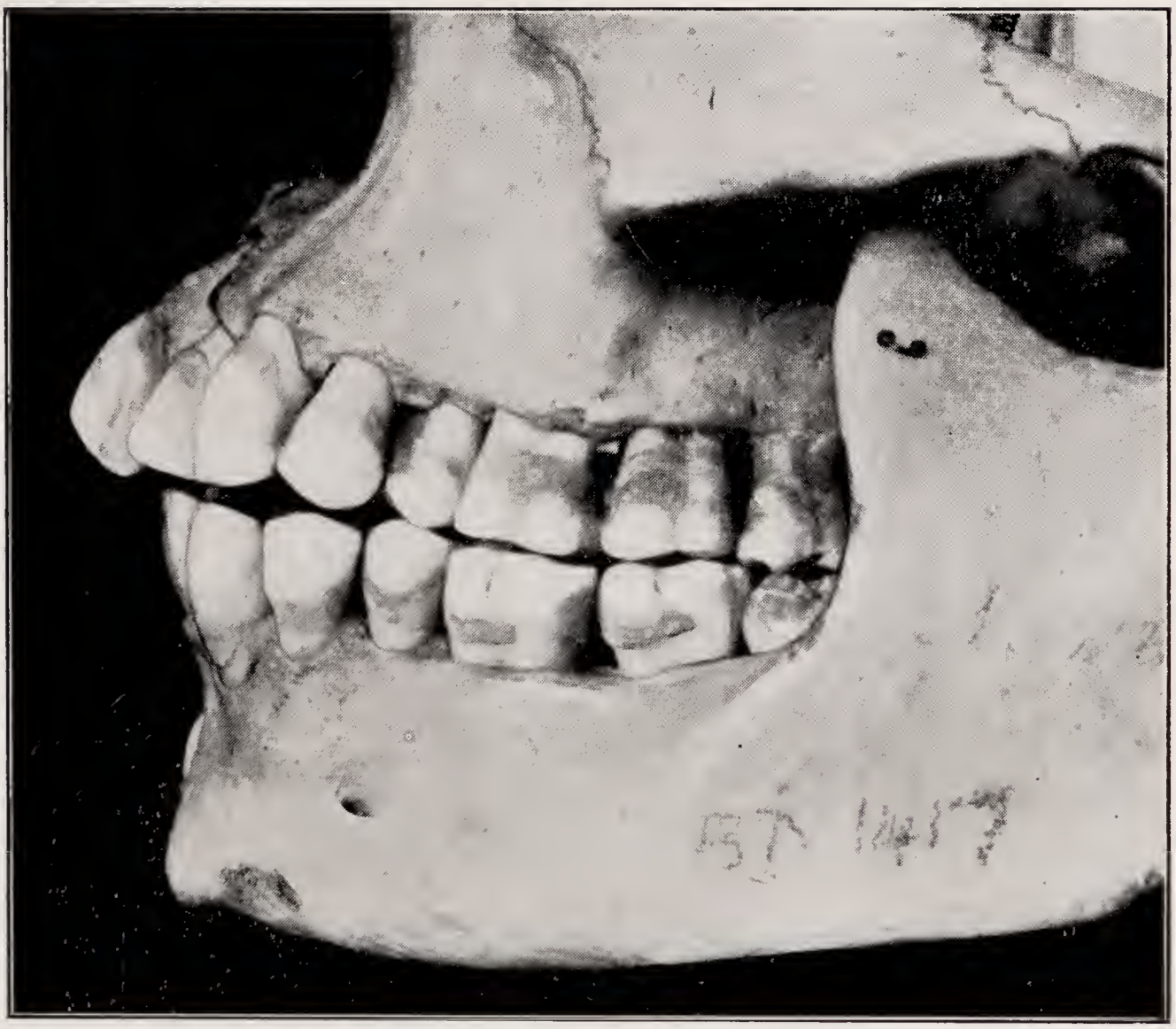
R.C.S. 1406. Actual size.

R.C.S. 1406. Actual size.

R.C.S. 1415. Actual size.

R.C.S. 1415. Actual size.

R.C.S. 1415. Actual size.



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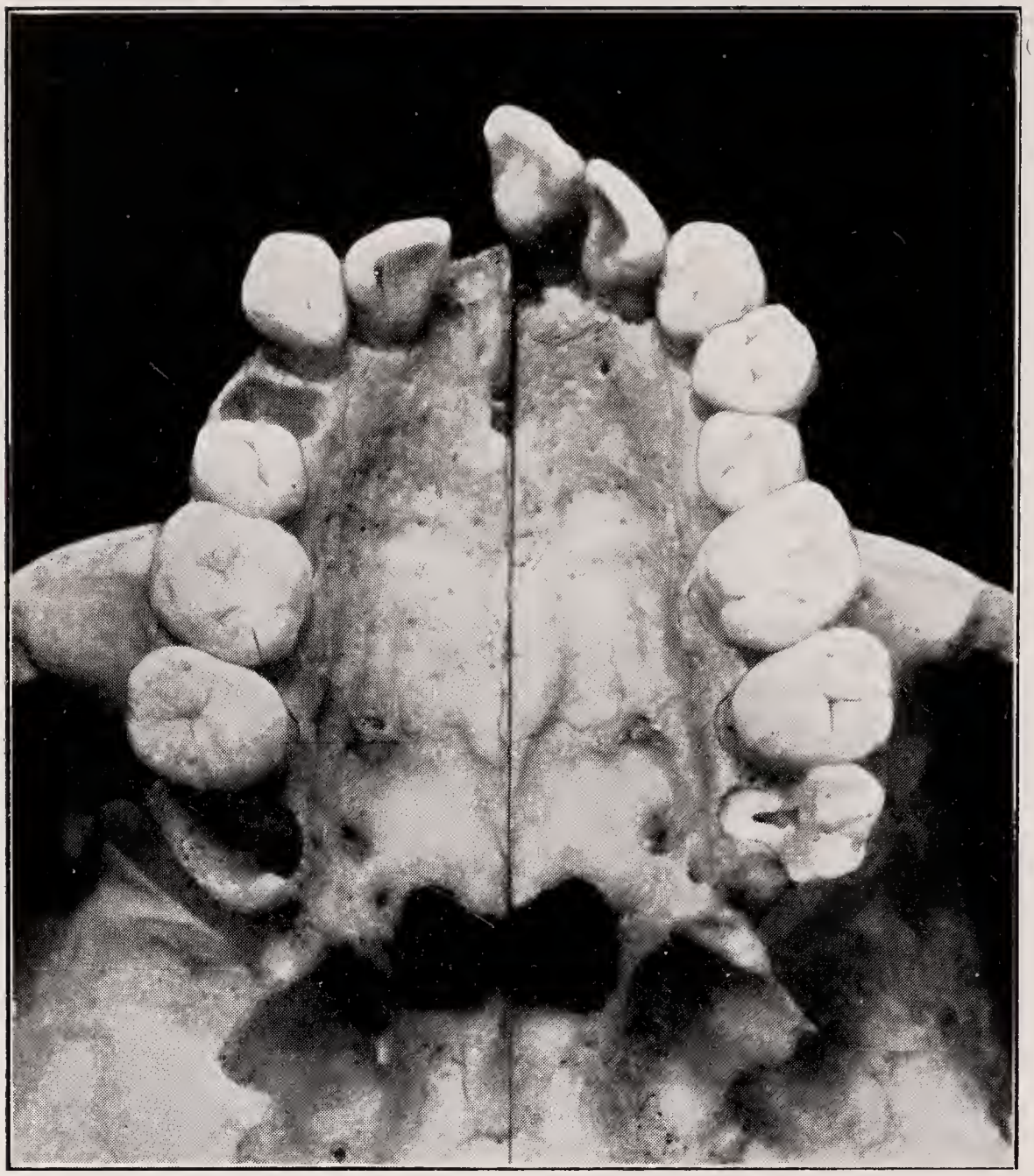
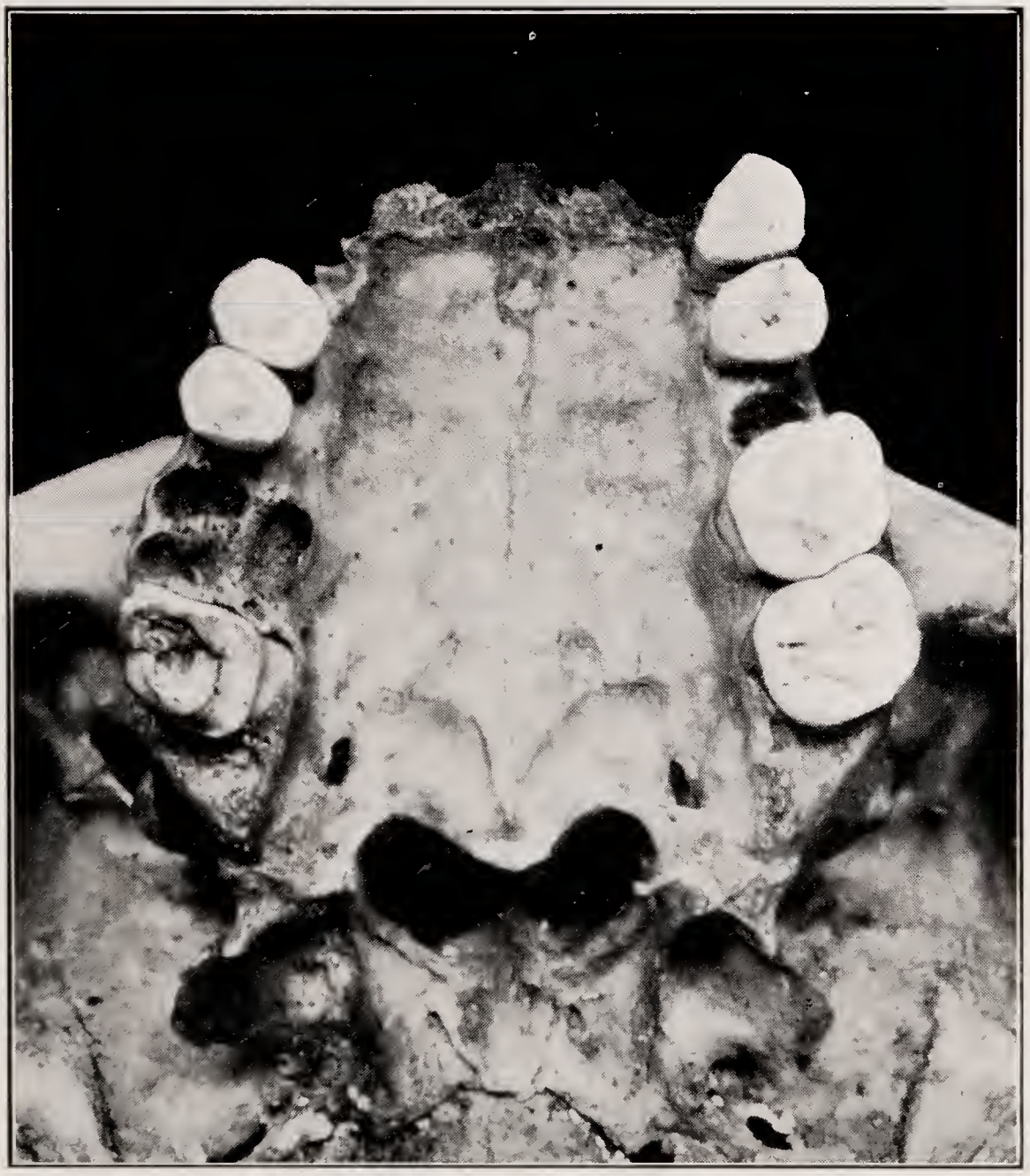


R.C.S. 1417. Actual size.

R.C.S. 1417. Actual size.

R.C.S. 1418. Actual size.



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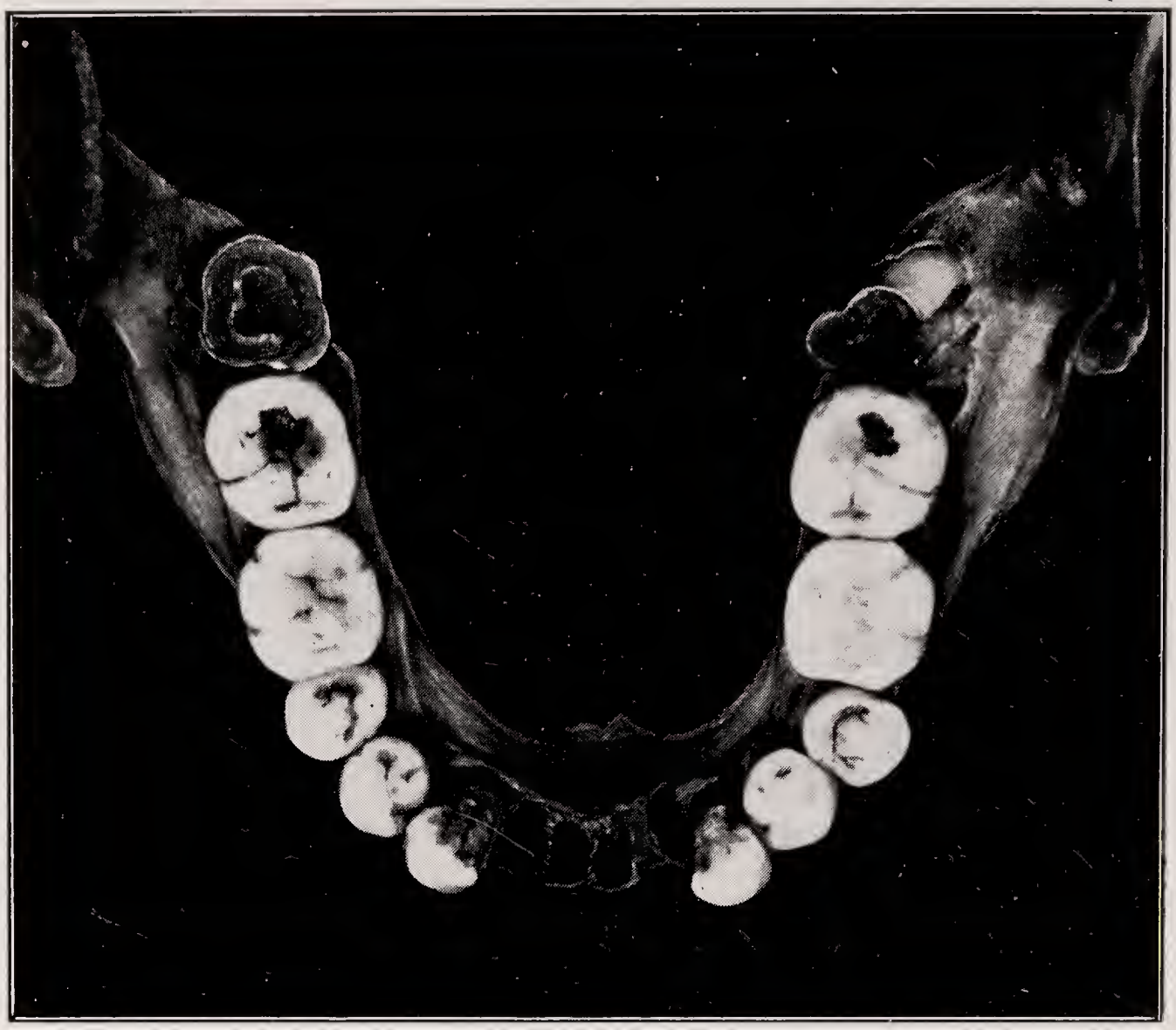
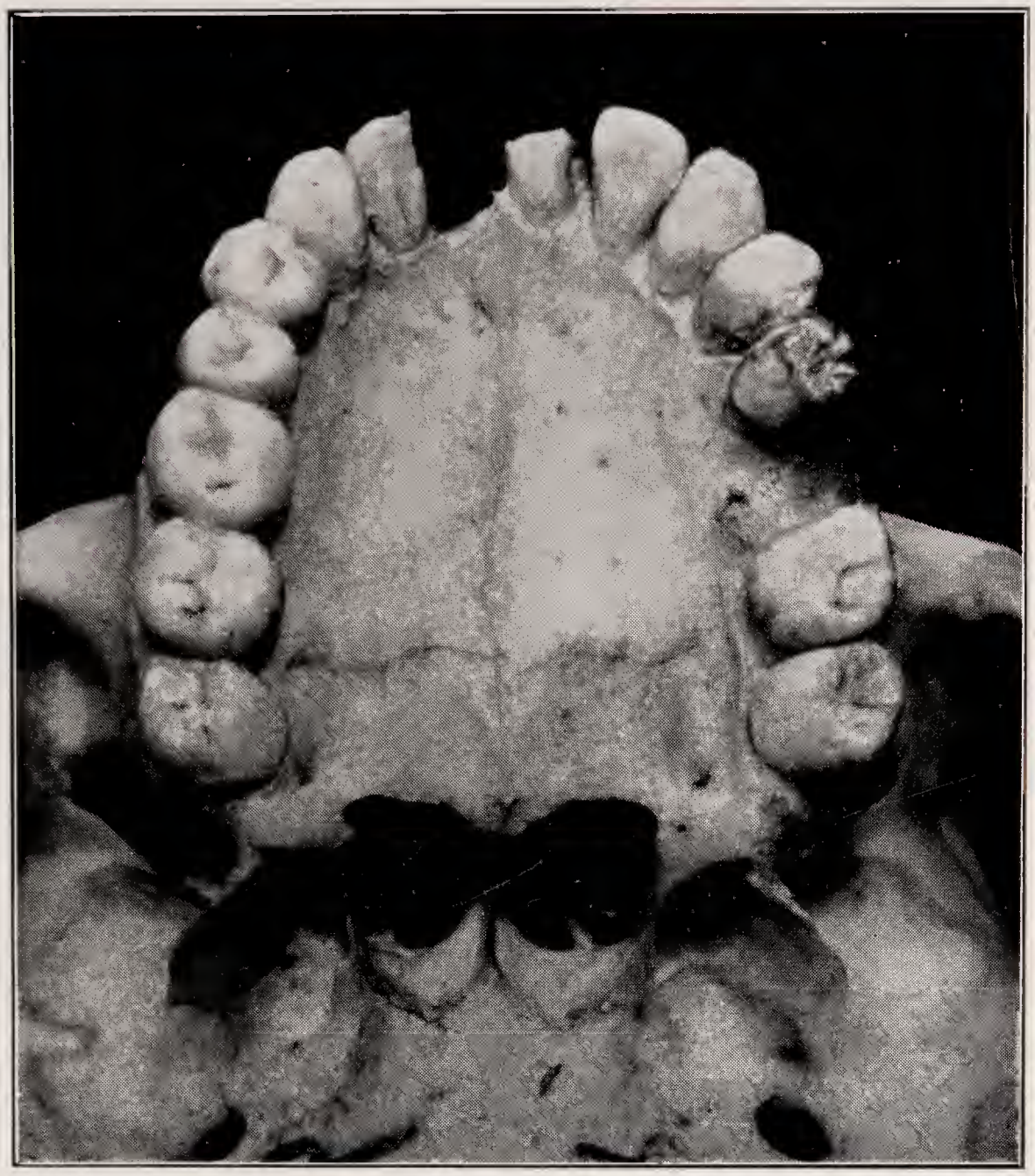
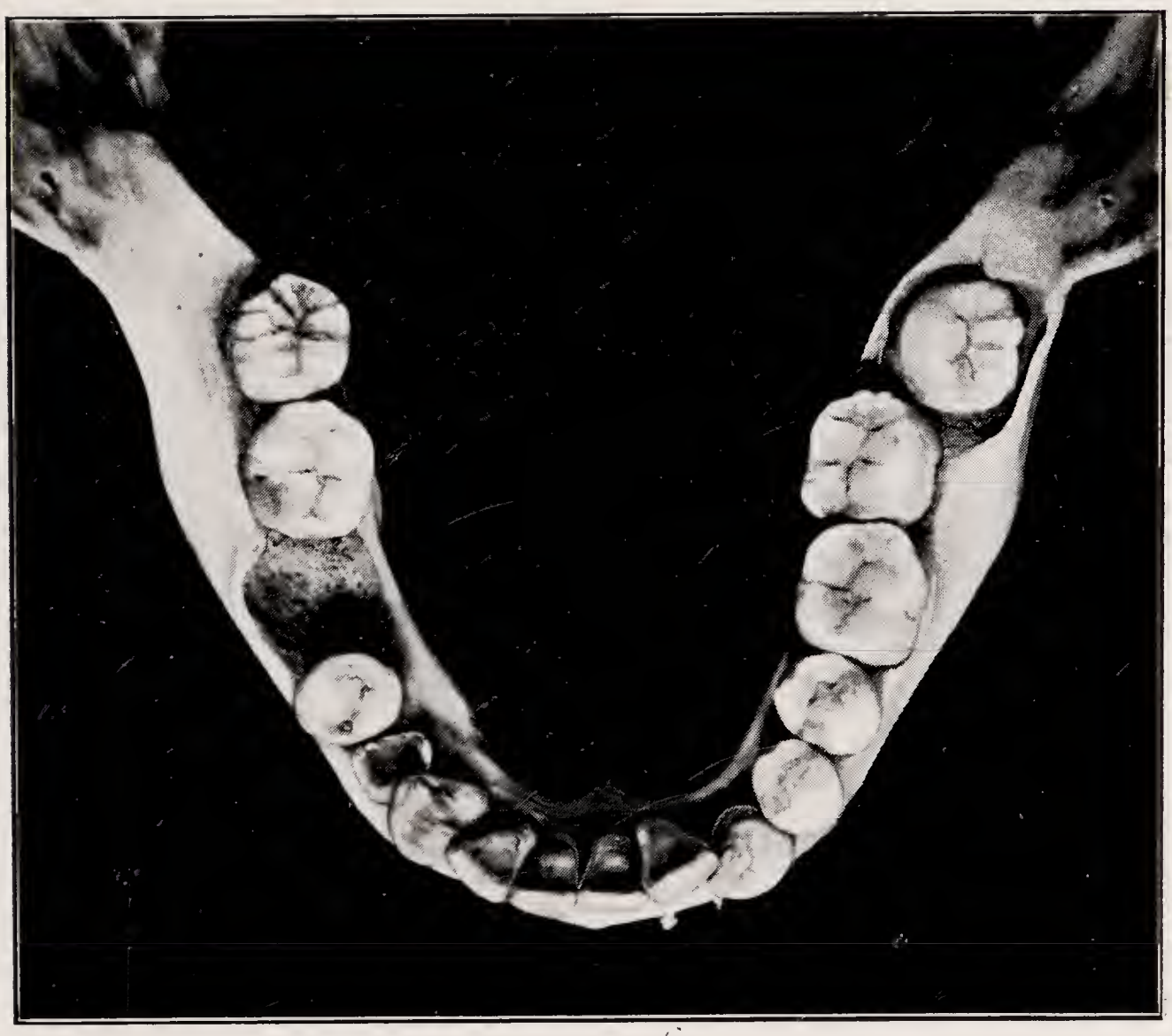


R.C.S. 1418. Actual size.

Capt. A. W. F. Fuller's Collection 1. Actual size.

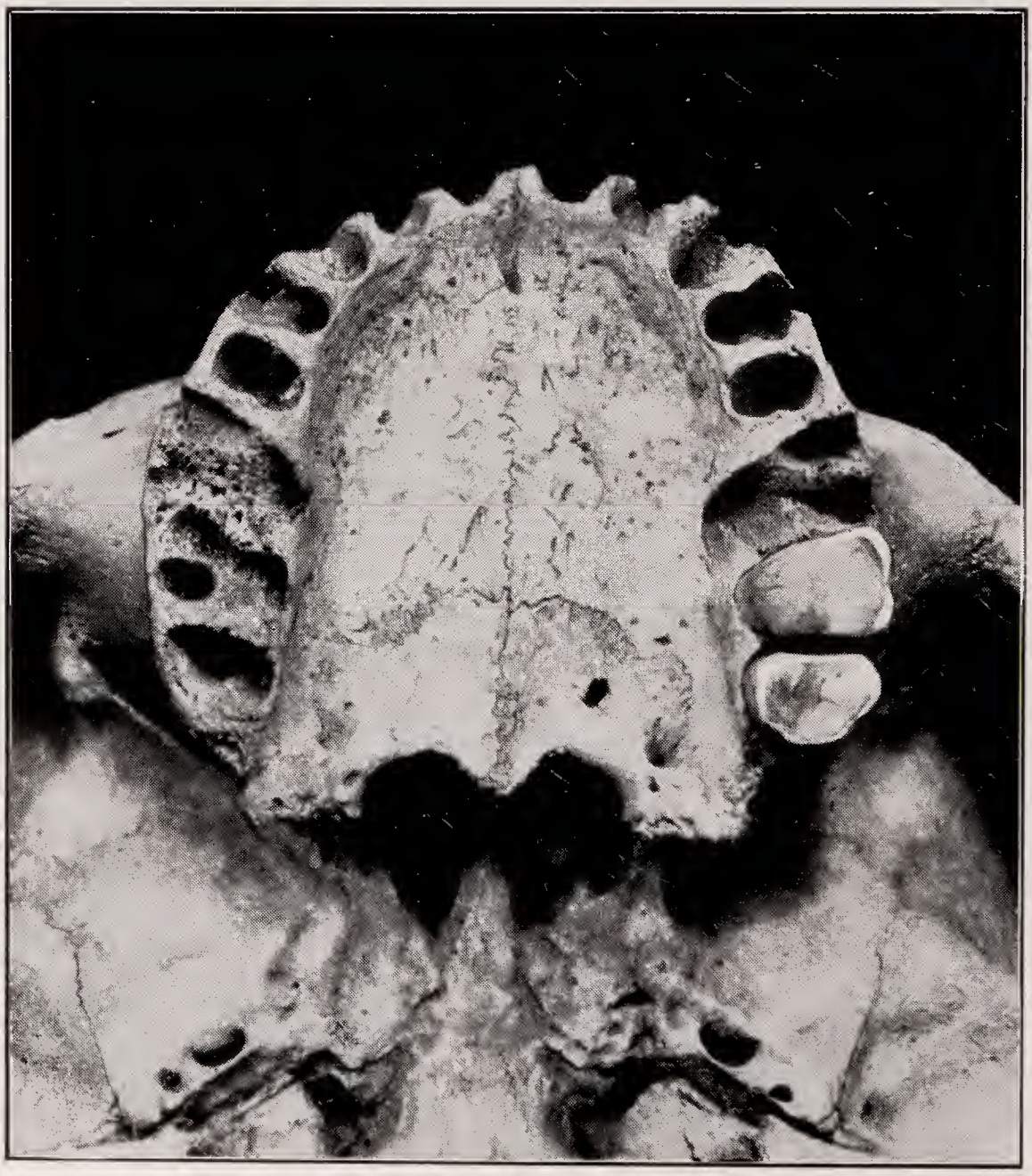


Capt. A. W. F. Fuller's Collection 1. Actual size.



Capt. A. W. F. Fuller's Collection 1. Actual size.

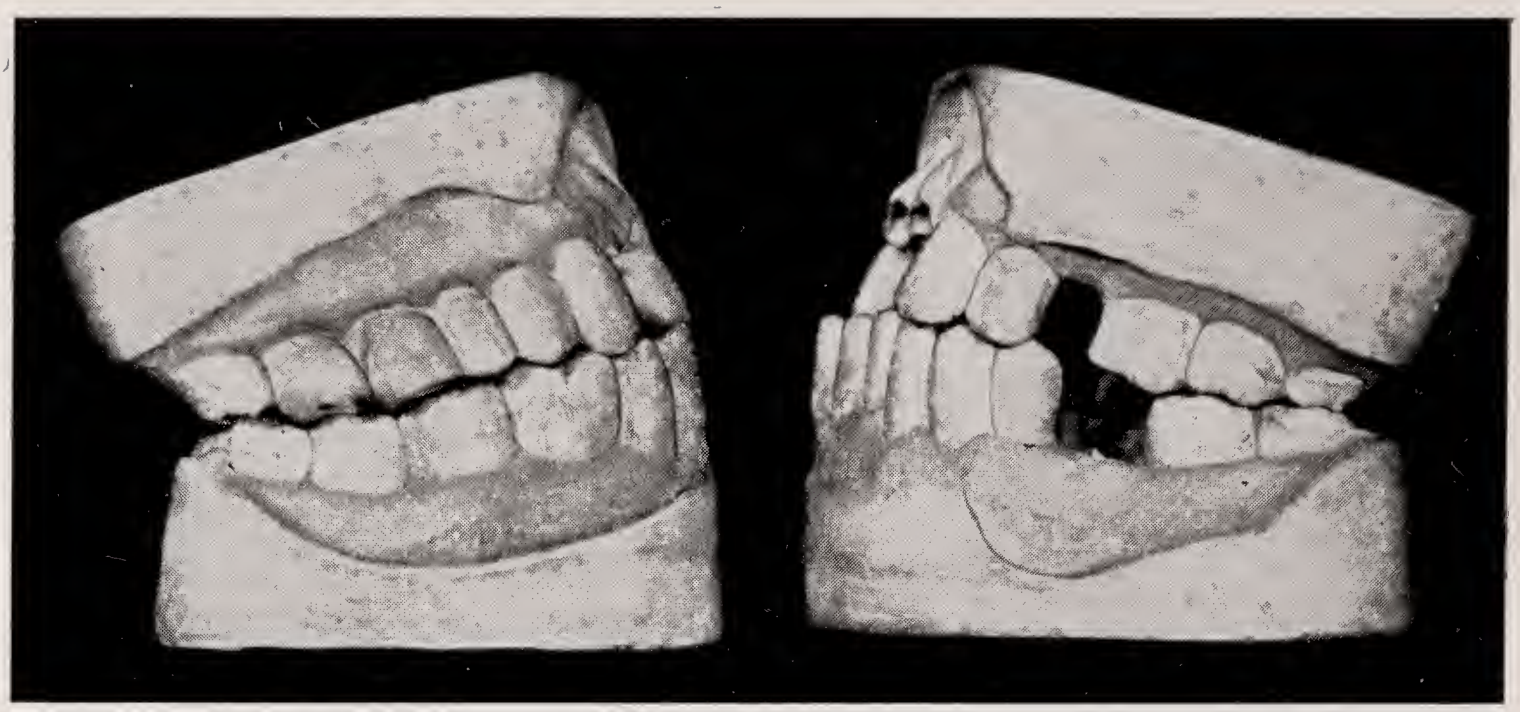
Capt. A. W. F. Fuller's Collection 2. Actual size.



Capt. A. W. F. Fuller's Collection 2. Actual size.

Capt. A. W. F. Fuller's Collection 3. Actual size.

Capt. A. W. F. Fuller's Collection 3. Actual size.



Natural History Museum, South Kensington.

94.1.20.1.

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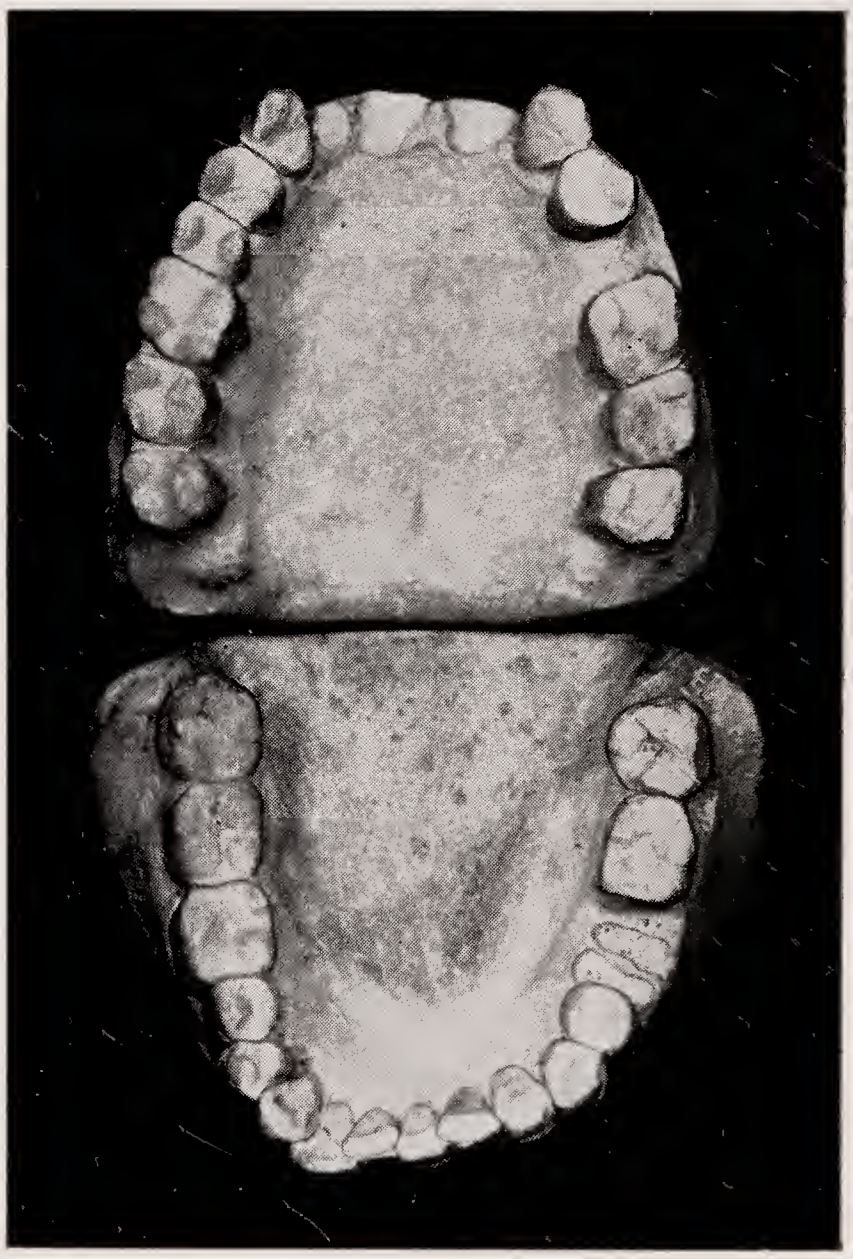
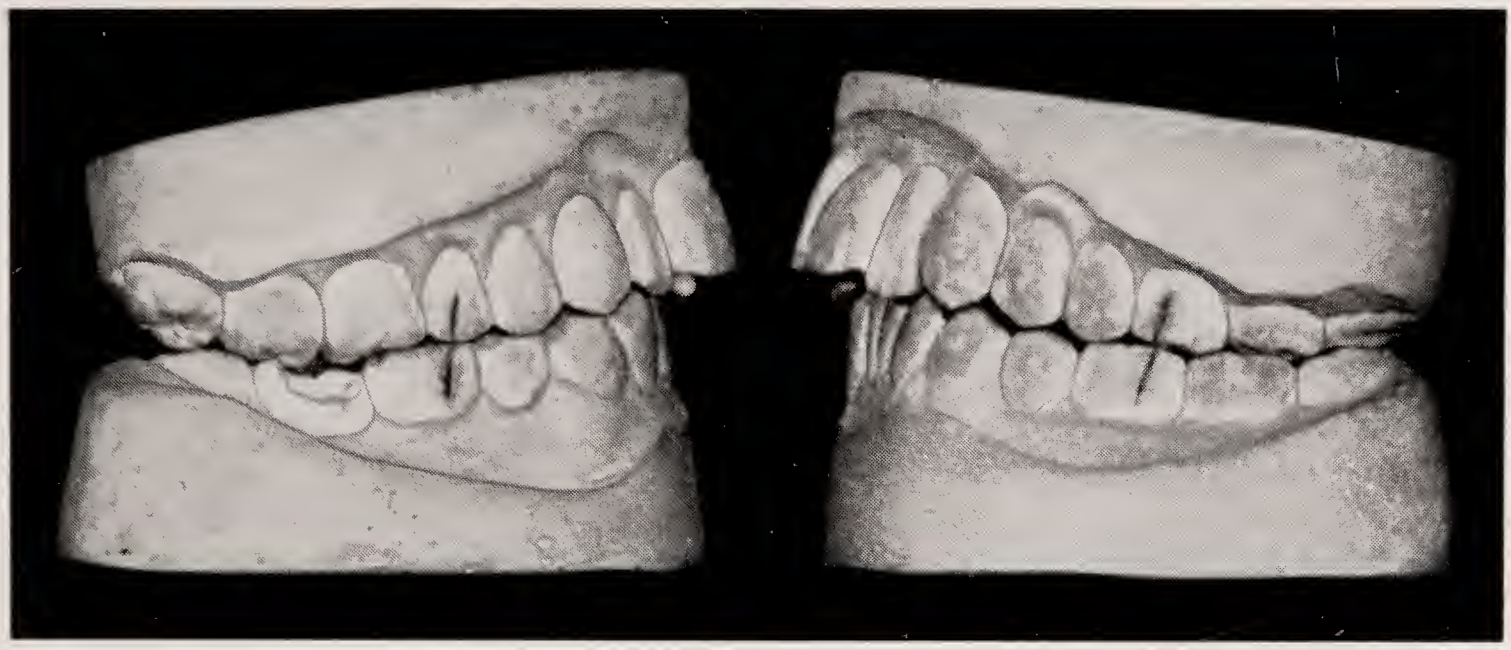




Oxford University
Museum.

AUS 80
5

Two-thirds actual size.

THE SIX YEAR OLD MOLAR*

By L. Russell Marsh, L.D.S.Eng.

In the title of this Communication I have particularly avoided using the term First Permanent Molar, because I wish to show that from certain points of view this tooth must be regarded as a member of the first dentition rather than of the second. This, of course, is not a new idea but it has an important bearing on orthodontic treatment, and I hope to persuade you that this tooth deserves our special attention in diagnosis and prognosis.

A large and vital part of the six year old molar is formed before birth, and therefore is subject to pre-natal influence. No one will deny that we townsmen are, compared with people of a century or so ago, a community of neurotics, and that of course applies to women too. So far as childbirth is concerned they are every bit as courageous as their ancestors, but it is a courage of determination rather than of unimaginative placid resignation. From our point of view the nervous strain of civilisation—call it that—affects the dentition of the child, and is a factor which medical and dental science are powerless to combat, least of all the pre-natal effect. I would go further and say that in the future we may have seriously to reconsider our views as to the universal advantage of natural feeding, at least after the first month or two.

We often notice that in cases where the deciduous dentition is very prone to caries, the permanent dentition when it arrives shows signs of greater resistance. In such cases the six year old molar tends to exhibit in some degree the weakness of the deciduous teeth, owing to the fact that a considerable portion of the crown is formed before birth. That it is by far the most vulnerable of the permanent teeth is not altogether explained by the fact that it is the first to erupt and therefore is subject for a longer period to mouth conditions. If statistics were taken there is no doubt that this tooth would be proved to be the most vulnerable to caries by a startling majority.

Accepting this fact, how does it affect the orthodontist. In conservative treatment it does not affect him at all, except that using these teeth for anchorage he is often wrongly blamed for their carious condition later. If, however, extraction forms part of his treatment the question arises whether he is justified in removing a sound tooth in a dentition where the six year old molar is prone to caries.

The temptation is to retain the molar. There is no denying its importance in the arch ; it is essential for anchorage in using a fixed appliance, and the removal of the first premolar provides a much more accessible space for the correction of anterior teeth. Even so I maintain that to remove sound premolars in a mouth

* Read before the Society, January, 1937.

where the first molars are likely to be lost early in life is a very grave responsibility, and one which is worthy of our serious consideration.

As I have mentioned in a previous paper I have frequently treated Class II cases by removal of the first molars, and the movement backward of the upper second premolars, first premolars and canines with removable appliances in order to obtain space for the correction of the incisors. Such treatment, if well timed, produces a good and permanent result. The upper molars must not be removed until after the eruption of the second molars, and the anterior teeth must assist the second molars as anchorage for the movement of the side teeth. If it is necessary to remove the lower first molars, this should be done if possible some time before the eruption of the second molars in order that the latter may erupt forward into the spaces created. Incidentally this obviates any possibility of lower third-molar impaction.

In conclusion I wish to make it clear that it is not my object to advocate the universal adoption of a particular line of treatment, but rather to bring to your notice a factor in our problems which in this country, where caries plays an important part in our work, cannot and should not be overlooked.

Discussion

Mr. W. A. Bulleid said it would be generally agreed that first molars sometimes had to be extracted on account of caries, and when that had to be done the only thing to do was to make the best of a very bad job. He thought they should be extracted only as a last resort, when no preservation of the teeth was possible, because, as far as his experience went, the extraction gave rise to closure of the bite, which prevented anything like normal occlusion of the front of the mouth being brought about. Mr. Marsh said that the first molar of the lower jaw should be extracted before the eruption of the second molar. That advice was sound as far as it went, but no second molar ever came up to the same level as the first molar or completely into the position of the first molar. It would always be tilted. If Mr. Marsh agreed that the removal of the first molars was an expedient to be adopted when nothing else could be done he was in accord with what Mr. Marsh had said, but if he advocated the removal of the first molars when by hook or by crook they could be preserved he disagreed with Mr. Marsh, for the reason that he had already stated, i.e., that closure of the bite would result.

Miss K. C. Smyth suggested that, in order to settle the point raised by Mr. Bulleid and many other points which might occur to the minds of the members, Mr. Marsh should show serial models of some cases treated in the way he had described—models before extraction and at stated intervals, three months or six months after extraction. She saw a great many cases in hospital which had to be treated by extraction, owing to caries, and the results varied very much. She thought the treatment was not always followed by closure of the bite, but she was not prepared to be definite on that point; she felt that models taken at stated intervals should be produced in order to settle it. It was a question that might very well be further investigated. She would like to know whether Mr. Bulleid thought that the bite closed with the extraction of the upper molars only, because she had always regarded that as a minor evil. She agreed with Mr. Bulleid that the extraction of lower permanent molars was fraught with disaster, because of the appalling tilting and rotation of the second molar, which usually

finished up with about one point of contact. The upper second permanent molars, however, seemed to swing forward in the most satisfactory manner, and when they had taken up sufficient space one could utilise the rest of the space for the background movement of the premolars and canines.

Mr. BULLEID said he agreed with Miss Smyth that the removal of the upper first molars was a very minor evil compared with the loss of the lower first molars, and he did not think the closure of the bite was very marked. Certainly the upper second molars came down and forward much more satisfactorily than the lower second molars came up and forward. In cases where the bite was already closed—and that was the very large majority of cases—the evil of the removal of molars was greater than in cases where the bite was normal.

Mr. H. G. WATKIN thought it might be very useful to have a paper read on when and when not to extract the first permanent molars. A whole evening might be occupied in discussing such a paper, but the broad principles could be stated in a few words. As in all orthodontic cases, each case was one by itself, but as a rough guide it could be said that there was a definite time when the first permanent molars ought not to be extracted, i.e. between the ages of 9 and 12½. If the first permanent molars were extracted very early, when the roots of the second permanent molars were short, these latter moved forward vertically in the alveolus and erupted in the position of the first permanent molars, and it was difficult to tell from their position that they were not first permanent molars. On the other hand, if the first permanent molars were extracted about the age of 10, before the second permanent molars were in occlusion, there would be a very great deal of tilting, and everything possible should be done to save those first permanent molars until the second permanent molars were in occlusion. If that procedure was adopted, tilting and also closure of the bite were prevented to a great extent. He was very glad that Mr. Marsh had qualified the title of his paper by using the term "first permanent molars." All orthodontists were indebted to the nomenclature committee for getting rid of old-fashioned terms, such as "six year old molar." He hoped that all members of the Society, especially those who, like Mr. Marsh, taught the present day students, would try to use the correct terms.

Mr. HAROLD CHAPMAN said he gathered from Mr. Marsh's Communication that the cases he had in mind would not have been treated until the second permanent molars had erupted. It seemed to him a grave disadvantage to have to postpone treatment until the patient was 12 years of age, or until such time as the second permanent molars had errupted. The cases in which he would be tempted to extract the permanent molars were those in which they would not last after the age of, say, 25 ; if he thought that a permanent molar would not last longer than that, he would probably decide to treat the case by the removal of the permanent molar, if he considered it to be a feasible solution of the problem. He confessed, however, that he would not advocate the removal of the permanent molars as much as he imagined other speakers did, from what they had said : one disadvantage was the great movement of premolars that is entailed. It seemed to him that the discussion had ranged over various things that actually happened with regard to movement of the teeth, e.g. rotation. If the Society had a museum in which there were models showing that those things did occur, it would be a great advantage and might give support to the statements which had been made that evening. If proof were forthcoming of such remarks which were made without any proof, it would teach all the members a very great deal. Mr.

Marsh had said at the beginning of his paper that people were much more neurotic now than they used to be. That might be so, but there was no proof of it ; it was possible that people who lived in the days of Robin Hood and were subject to attacks by his outlaws suffered from nerves just as people did to-day. He had enjoyed listening to Mr. Marsh's Communication; any Communication by Mr. Marsh was not only interesting but written in such a way as to be convincing.

Mr. L. R. Marsh, in reply, said that in view of the remarks which had been made by several speakers he wished to make it clear that he was not recommending treatment by extraction. He had merely dealt with the question as to whether, if they were going to remove teeth, orthodontists were justified, in Class II cases, for instance, in removing two perfectly sound premolars when the six year old molars were carious and when possibly their removal and the use of the spaces left could be employed to effect the requisite treatment. In answer to Mr. Bulleid, he did not recommend the removal of the six year old molar unless its removal was inevitable within a reasonably short space of time. He agreed that in some cases it would be highly inadvisable to use that form of treatment, and it might be far better even to crown the teeth, or be prepared to crown them later on, rather than remove them. In the cases he had treated he had not experienced any trouble with regard to the bite, but he would hesitate to treat a case of very close bite, which was not responding to bite-opening treatment, by removal of the molars. He thought the lower molars should be removed only as a very last resort, if one or both of them were completely unsavable. In the ordinary way one would not remove lower teeth at all in Class II cases, and probably the removal of the six year old molar in a Class III case would not benefit the case very much ; it would be merely emergency treatment. In reply to Miss Smyth, when he had read papers on previous occasions he had shown models of cases treated in the manner in question, and that was why he had not shown any models on the present occasion. He believed that Mr. Watkin, in recommending the removal of the six year old molar as early as possible, was considering rather Class I cases, in which he hoped that the gaps would be filled up from behind. In those cases, of course, the earlier both the upper and lower six year old molars were removed the more likely were the twelve year old molars to come into place. He agreed with Mr. Chapman that if one treated a case by removing the six year old molars one had to leave the extraction until rather late. Upper first premolars might be removed at the age of 10 or 11 possibly, whereas the extraction of first molars would have to wait until after the age of 12 (and perhaps until the patient was 13 or 14 years of age) for the eruption of the second molar. In those cases a good deal of treatment could be carried out before that age. He had used fixed appliances on the first molars, and saved them as long as possible, doing various work about the mouth in preparation for their removal at the proper time.

Notes on Classification, Prognosis and Treatment*

By Harold Chapman, L.D.S.Eng.

This Communication had its origin at the Empire Meeting of the British Dental Association in July, 1936, when Dr. Friel read a paper on "Orthodontic Education," in the discussion of which I mentioned that orthodontics has not generally accepted foundations, particularly as regards treatment. This paper is an attempt to provide some foundations.

At the meeting of this Society in December, 1936, I gave a Communication entitled "Orthodontic Errors," which was a report of cases that had been treated with unsatisfactory results. I continue the subject now and put forward some suggestions in regard to treatment which, if adopted, will be to the advantage of our patients.

The last thirty years has seen orthodontics develop almost intensively, but the aggregate results are nothing to be proud of. In this time many must have learnt that certain treatments yield good results and certain ones bad results—there are so many indifferent results that it might be well for this Society to consider and make a pronouncement upon what is and what is not possible in the way of orthodontic treatment.

It is necessary that you should see the orthodontic problem as I do if you are to agree that my suggestions are sound. As regards treatment the problem is largely a bone problem of which there are at least four aspects, each having a different solution, though it would appear that the profession envisages orthodontics as presenting one problem capable of one solution—all the teeth in perfect occlusion : in practice I have not found this one solution capable of attainment.

In many cases the teeth can be arranged so that the occlusion is perfect, but it must not necessarily be inferred that the teeth will remain permanently in their new positions without artificial retention unless they would have done so without any treatment whatsoever.

The object of this Communication is to invite attention to the anatomical or BONE ERRORS which characterise various forms

* Read before the Society, February, 1937.

of malocclusion, and to stimulate consideration of the possibility of correcting these anatomical or bone errors. There are at least four types of errors which may occur singly or in any combination, or number of combinations.

Types of Dental Irregularities.

Classification indicating the probable bone (anatomical) error or diagnosis, treatment, i.e. bone changes to be effected (if normal occlusion without extraction of teeth is sought), and prognosis.

Only the more common variety or varieties of each type is referred to. Irregularities due to local causes are not included.

CLINICAL APPEARANCE OF BONE ERROR.		Prognosis if all teeth retained and normal occlusion obtained.
(1) Malposition of individual teeth.	(1) Orientation of the tooth socket.	o
(2) Small arches (irregular incisors).	(2) Tooth-bearing area of the maxillæ too small : masticatory face too small.	—
(3) Incorrect arch relationship (antero-posterior).	(3) Insufficient or excessive antero-posterior growth in the mandible posterior to the tooth-bearing area.	+
(4) Excessive overbite.	(4) Disproportion of vertical growth of one part of the tooth-bearing area to another of either or both jaws.	—

The classification is amplified as follows :—

\+ = Good ; o = Dependent on circumstances ; — = Bad.

The ERROR may appear as :—

(1) **MALPOSITION OF INDIVIDUAL TEETH** in arches otherwise normal.

The error is in the ORIENTATION OF THE TOOTH SOCKET, which results in rotation or other error of position of the tooth.

This error occurs in other than normal occlusion, but is referred to in this way to make it clear that it may be a definite error and occurs when there would appear to be no reason for it, other than the position of the tooth.

(2) **SMALL ARCHES** (irregular incisors), (Class I Angle, Class II Bennett). (Figs. 1, 4, 6, and 7, pages 57, 59, 61, 62.)

The error is in the TOOTH-BEARING AREA OF THE MAXILLA AND MANDIBLE in particular, and in the masticatory face, which is TOO SMALL ; it results in :—

Imperfect alignment of the teeth, e.g. rotation and imbrication.

(A) The upper and lower arches are involved to the same extent.

(B) The upper and lower arches are not involved to the same extent.

Bucco-lingual errors of occlusion of the cheek teeth (not as common as (2), above, or (3), below) result from lack of correspondence of arch breadth of the two arches—it may be the result of lack of correspondence in breadth of the maxillary and mandibular bases : it might be occlusal only, i.e. the positions of the teeth are at fault. If the lower arch breadth is normal and the upper arch breadth only one cusp too narrow (i.e. an amount which is equal to half a cusp on each side, or a full cusp on one side) then possibly there is slight secondary lateral deviation (or error of arch relationship) of the mandible : the condition is treated by symmetrical increase of arch breadth of the maxilla, during which the position of the mandible corrects itself. This is not an example of error of arch relationship except in a modified and minor manner. The error mentioned is the commonest of this type : another form is that in which all the lower teeth are completely within the upper arch, this is not common—other types are still less common ; the latter example is an example of difference in relative size of the maxillary and mandibular bases and not of arch relationship.

N.B.—Increase of breadth of all arches, normal and abnormal, is expected to occur between the ages of 4 and 14 in all healthy children. Therefore orthodontic treatment for all children between these ages should either include increase of arch breadth, particularly of the maxilla, or should not prevent natural increase of arch breadth occurring.

(3) INCORRECT ARCH RELATIONSHIP (Antero-posterior).

The error is probably the result of INSUFFICIENT OR EXCESSIVE ANTERO-POSTERIOR GROWTH IN THE MANDIBLE POSTERIOR TO THE TOOTH-BEARING AREA, which results in antero-posterior malrelation of the arches to one another. (Classes II and III Angle, Class III Bennett). (Figs. 5, 6, 7 and 8, pages 60, 61, 62, 63.)

(A) Lower arch postnormal to the upper arch : this is frequently found in connection with No. 2 :—

(i) Without retrusion of the upper permanent incisors (Class II, Div. I, Angle).

(ii) With retrusion of the upper permanent incisors (Class II, Div. II, Angle).

B. Lower arch prenormal to the upper arch.

Error No. 3 without No. 2.—The upper arch breadth is a little narrow for the lower arch breadth when the mandible is brought into normal position, but this is not sufficient to affect prognosis (it is assumed the bucco-lingual relations are correct).

(4) EXCESSIVE OVERBITE.

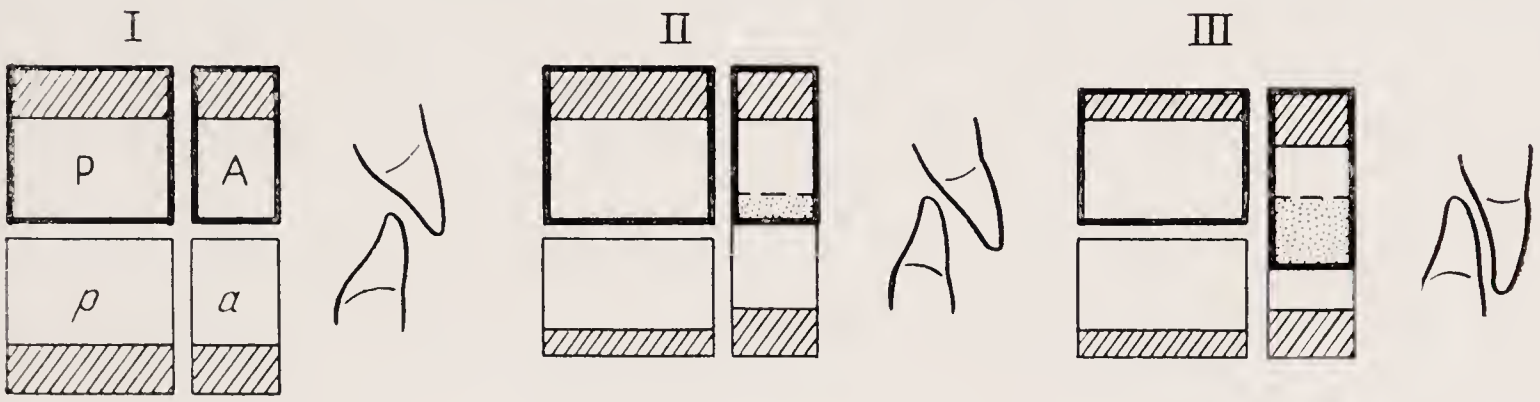
The error is one of DISPROPORTION OF VERTICAL GROWTH OF ONE PART OF THE TOOTH-BEARING AREA TO ANOTHER OF EITHER OR BOTH JAWS.

(A) The vertical development of the bone beneath the lower premolars and molars is probably insufficient compared with the

incisor region, resulting in excessive overlap of the upper and lower incisors. (Figs. 2 and 8.)

Fig. 2.

Diagram to show how lack of correlation in vertical growth of one part of the Maxilla or Mandible compared with another may result in excessive overbite



□ = Alveolar bone ▨ = Basal bone ▩ = Overbite

A . P. = Maxilla (A = Incisor area . P = Molar area)

a . *p*. = Mandible (*a* = Incisor area *p* = Molar area)

I . Normal

II . Excessive overbite due to deficient vertical growth of the basal portion of the mandible in the area of the cheek teeth. This is the common type.

III . Excessive overbite due to deficient vertical growth of basal portion of both the maxilla and mandible in the area of the cheek teeth may result in excessive overbite greater than in II

Fig. 2 represents diagrammatically a section of the jaws in the median line : each jaw is divided into an anterior or incisor area (A, a) and a posterior or molar (cheek teeth) area (P, p) ; each area is again divided into a basal (shaded) area and an alveolar or tooth-bearing (clear) area.

It is believed that excessive overbite may be the result of lack of correlation of vertical growth of the basal area P and A, and of p and a : basal area P or p may lack vertical growth in relation to A or a, or the basal area A and a may have too much vertical growth in relation to P and p : any one of these or combination of them may result in excessive overbite.

The extent of eruption of teeth is not a factor affecting overbite,

The numbers under the following headings " Bone Changes " and " Prognosis " refer to the paragraphs above with corresponding numbers.

If all the teeth are retained and normal arches and arch relationship obtained the following should be the :—

(1) BONE CHANGES (TREATMENT).

(1) Changes in bone surrounding roots of teeth.
(2) Increase of amount of bone, comprising the masticatory face, in all planes.
(2B) Probably some increase or re-arrangement of bone comprising the area of the maxilla involved or both halves of the maxilla.
(3) Changes in the mandible behind the tooth-bearing area, probably in the region of the neck of the condyle.
(4A) Vertical increase of bone beneath the lower premolars and molars ; that is an increase in one particular area and direction of a bone is required.

(II) PROGNOSIS

Prognosis here is a consideration of the possibilities of the above Bone Changes resulting from treatment :—

(1) Rotation of incisors : good if done before the apex is fully calcified. Labial inclination of incisal edges of upper incisors ; as for rotation but more doubtful. (In cases of rotation combined with imbrication, i.e. in Class I cases, retention in perfect alignment is difficult.)
(2A) Bad (if arches are enlarged unless the degree of arch breadth increase is only a very little in excess of what would normally occur).
(2B) Good if lower arch is good.
(3) Good.
(4A) Doubtful and should therefore be classed as bad.

In view of the unfavourable prognosis of many cases as outlined in (II) (above) on account of the impossibility of bringing about the bone changes outlined in (I) (above) treatment, having a better prognosis, must be adopted or the idea of treatment abandoned.

The treatment recommended is briefly outlined in the following paragraphs which are numbered to correspond with the arabic numbers under the heading " Types of Dental Irregularities."

(III) TREATMENT.

(1) In these cases it is of the greatest importance to be able to diagnose :—

(i) The normal at any age (this is difficult in some cases at certain stages (Fig. 3, page 58).
(ii) The conditions which will not correct themselves. The latter should be treated as soon as it is deemed that they will not correct themselves.

It should be remembered that incisors, and even canines, change their position very considerably after eruption, and sometimes several years after eruption, though usually most improvement occurs in the first two or three years after eruption.

(2) The writer believes that in those cases in which the arches will not enlarge naturally (diagnosis is difficult at some stages) they cannot be enlarged permanently by artificial means, and therefore extraction should be resorted to ; the first premolars are the most favourable teeth to remove, though there are numerous exceptions : frequently it is preferable not to remove a lower tooth.

(3) The most, and probably only, satisfactory method of treating these cases is by intermaxillary traction ; perhaps a small percentage of Angle Class II, Div. I cases may be treated successfully by other means, provided there is no excess overbite : that many, if any, of such cases can be successfully treated with removable appliances is a myth in my opinion and a very unfortunate delusion. If this type of irregularity is combined with type (2) the treatment must include the treatment of that type, i.e. extraction, but usually in the upper arch only. The size and shape of the chin cannot be altered by the usual orthodontic procedures, but its antero-posterior position can be changed.

In Class II, Div. II, treatment may be by moving $\underline{1 \mid 1}$ labially AND bringing the mandible forward as in Div. I ; it frequently comes forward without intermaxillary traction if conditions are made favourable for this to occur. Bite plates appear to have a good effect in these cases. On the other hand treatment by extraction of upper teeth is also indicated ; in this latter the position of the mandible is not changed.

(4) I usually rely on medial movement of the mandible (suggested to me by Friel) to get over the difficulties which excessive overbite presents : even then I occasionally use a bite plate when little benefit has been obtained, though without great faith, and if there is relapse of the overbite I look to the upper incisors to retain their positions and the lower incisors to give way and become imbricated. (Fig. 6.)

Important points the profession, both specialists and general practitioners, must know are the normal changes that occur in the denture, particularly between say 4 and 10 years of age or later, such as :—

(1) Increase of arch breadth.
(2) Forward movement of all the lower teeth in relation to the upper ones.
(3) Reduction of the overbite of either or both the deciduous or permanent incisors.

Without such knowledge a diagnosis is not possible, and without diagnosis there is no foundation for treatment. If treatment brings about these effects one does not know whether they would have occurred naturally or not. Fig. 3 shows natural increased upper arch breadth of nearly 5 mm. in five years : this is more than in any other case I have examined. Fig. 4 shows increased $\underline{6 \mid 6}$ arch breadth of 1.5 mm. Fig. 6 shows increased $\underline{6 \mid 6}$ arch breadth of 2.75 mm. stated above ; the two latter cases were treated and the increase stated above I regard as the residual permanent increase, and what I believe would have occurred if there had not

been any treatment. (The arch breadth in both cases was increased by treatment about 5 mm.; there was relapse of half this amount and a residual increase of 2.50 mm., which is the amount of increase I have found to occur naturally in normal cases.[1]) I have not had sufficient opportunity to test this in abnormal cases. These facts bring out the importance of recognising normal occlusion at any age. Irregular incisors and other factors may lead one to assume a case to be abnormal which is in fact normal for the time being for the particular individual (Fig. 3). Such considerations lead one to suspect that many treated cases, which one has regarded as having been brought to a successful conclusion, may never have been abnormal, and so I feel serious doubt whether appliances have caused arches to be widened or overbite reduced permanently (there are a few exceptions, some of which have been referred to above). It is to be noted that the natural increase of arch breadth in the cases referred to [1] (Fig. 3 is excluded from this consideration as it is exceptional, so far as one knows) is rather greater than that in the cases which have been treated.

I base treatment on the principles and beliefs which I have enumerated above and in "Orthodontic Errors" read before this Society in December, 1936, as well as in other papers (particularly [2]); I confidently believe that if they were generally followed, both the public and the profession would have greater cause for satisfaction as regards orthodontic treatment than is the case at present.

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(2) Idem, *Trans. 2nd International Orthodontic Congress*, 1931. P. 290.
(3) Smyth, Corisande and Young, Matthew, "Facial Growth in Children," Medical Research Council, 1932.

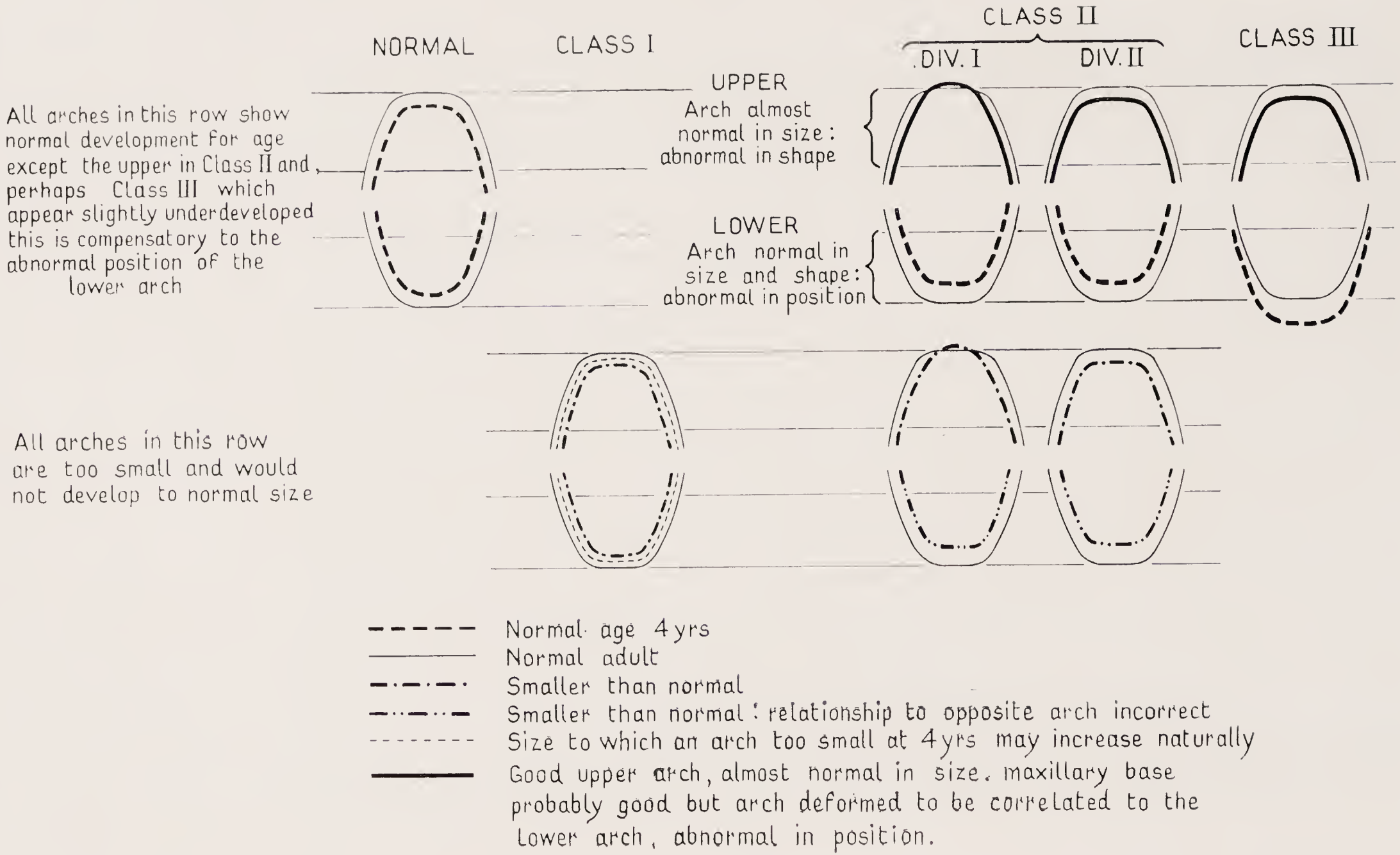

NORMAL
CLASS I
CLASS II
DIV. I
DIV. II
CLASS III
UPPER
Arch almost normal in size: abnormal in shape
LOWER
Arch normal in size and shape: abnormal in position
All arches in this row show normal development for age except the upper in Class II and, perhaps Class III which appear slightly underdeveloped this is compensatory to the abnormal position of the lower arch
All arches in this row are too small and would not develop to normal size
Normal age 4 yrs
Normal adult
Smaller than normal
Smaller than normal: relationship to opposite arch incorrect
Size to which an arch too small at 4 yrs may increase naturally
Good upper arch, almost normal in size. maxillary base probably good but arch deformed to be correlated to the lower arch, abnormal in position.

Fig. 1.—Diagram to show that in Classes II and III the arches may be normal in size (upper row) or too small (lower row) as in Class I; if the latter, the maxillary and mandibular bases and masticatory face are too small.

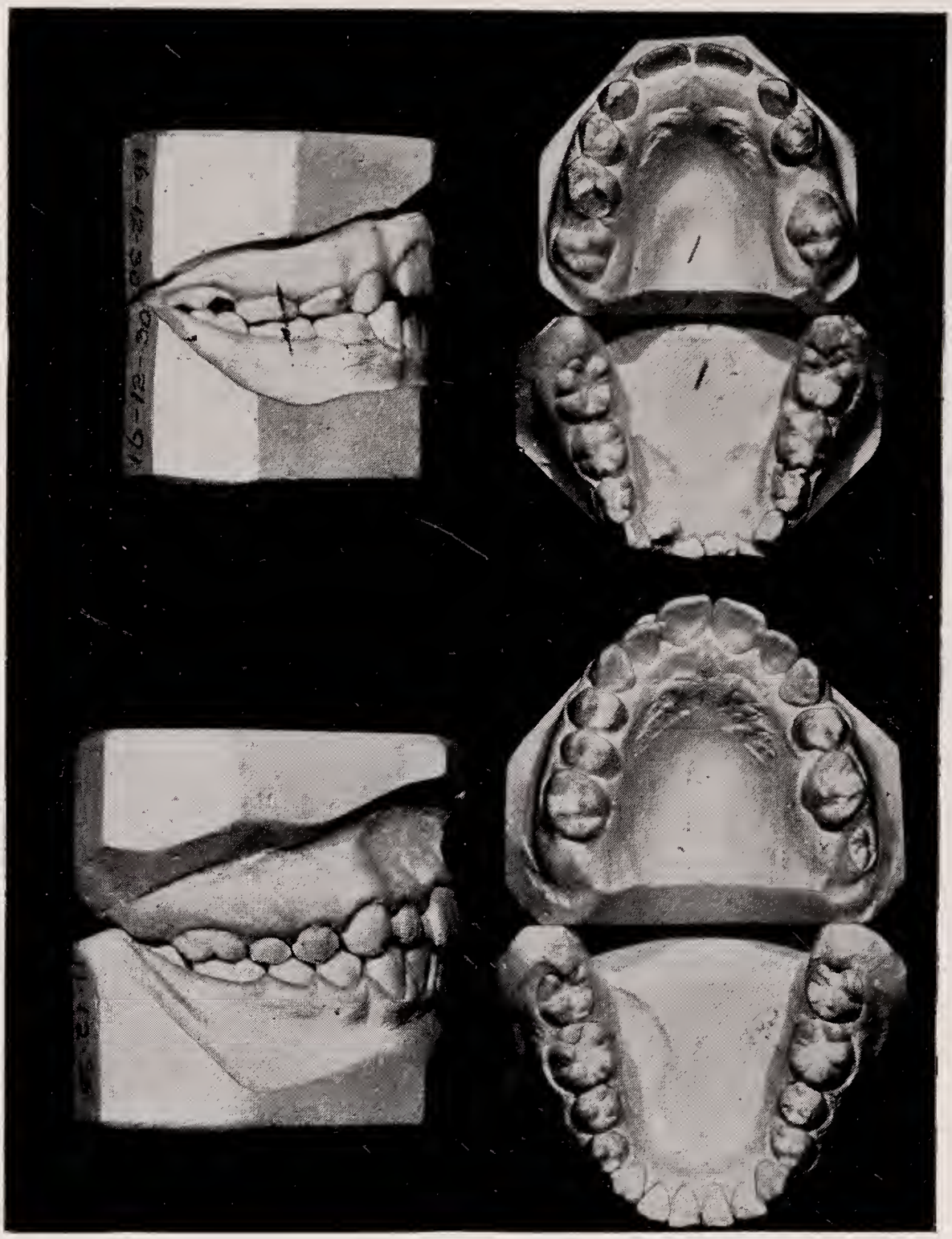


Fig. 3.—Case 2645. Ages 6–9 and 11–9. F. Normal Occlusion.

$\frac{6|6}{}$ arch breadth increased 4.5 mm. and $\frac{6|6}{}$ 1.4 mm. (all deciduous molars replaced) in five years. No orthodontic treatment. Sunlight and cod-liver oil administered for general health at time of first models. Premature loss of $\frac{|e}{}$ and $\frac{|4}{}$.

The arch breadth increase is about double what is usually found and so this case must be considered exceptional.

(By kind permission of Messrs. A. L. Packham and H. R. Evans, Royal Dental Hospital.)

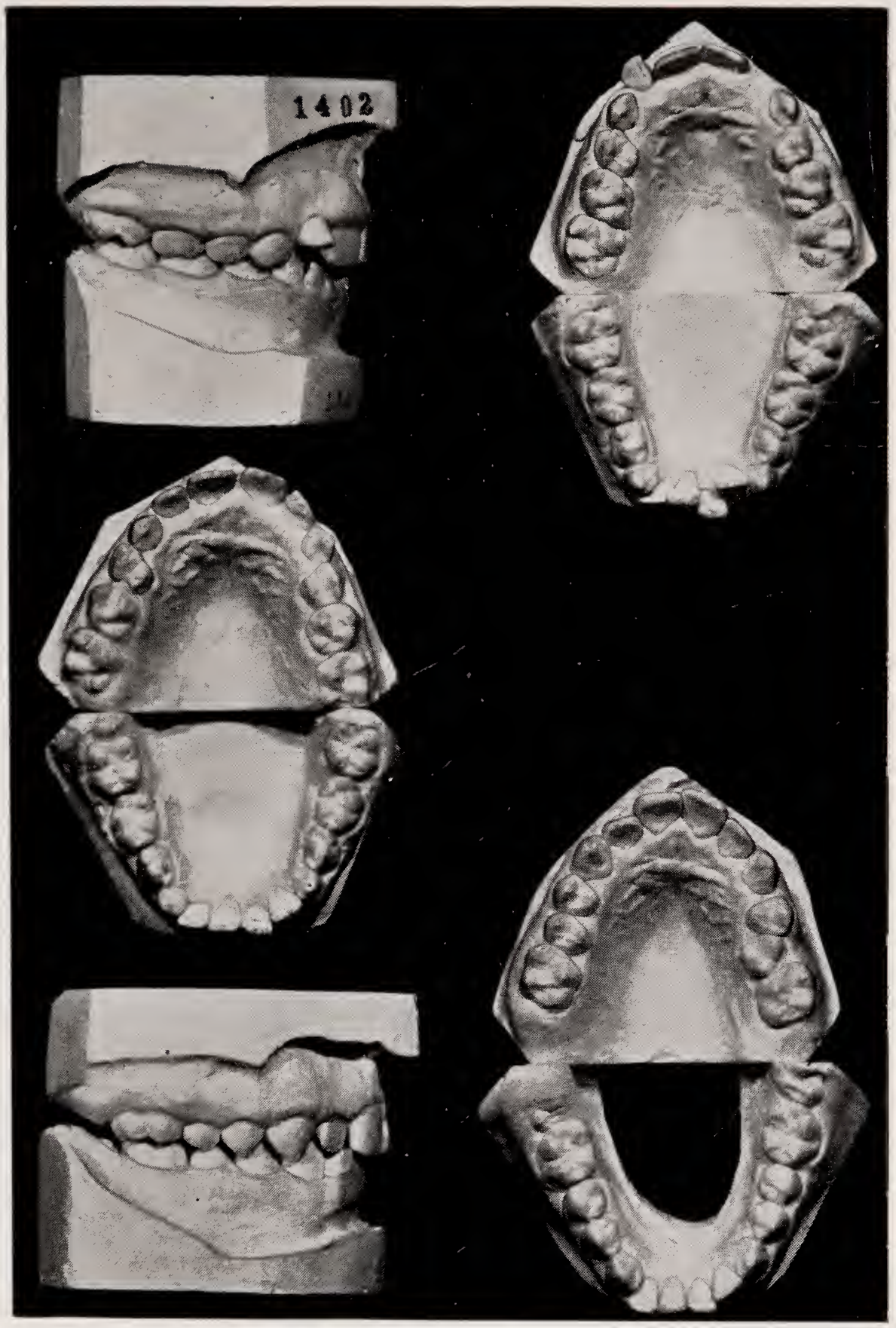


Fig. 4.—Case 1402. M. Age 8–2. Class I (Angle), Class II (Bennett).

Tooth movement, upper occupied 9–12 year; lower 2 3–12 years, but slight after 9–12 year; the 2 3–12 years included two rest periods; lower appliances worn 4 7–12 years: during the last 1 3–12 years intermittently: upper appliance worn 9.12 year only.

		Increase of arch breadth cf. with original breadth.	
Models.	*Age.*	$\frac{6 \mid 6}{}$	$\frac{}{6 \mid 6}$
1402	8–2	—	—
1402A	8–11	4.0 mm.	4.0 mm.
1402D	12–9*	1.5 mm.	0.5 mm.
	11–2	Fixed lower appliance discarded.	
	11–6	$\frac{6 \mid 6}{}$ arch breadth has decreased 3 mm. since age 11–2. Gave removable lower retainer for night wear.	

* All deciduous molars have been replaced by premolars. Last appliance discarded. There are no later models.

12–9 Lower retainer does not fit—discarded. $\overline{64 \mid 46}$ arch breadth as at age 11–6.
13–5 No relapse since age 12–9.
14–9 Appears as at age 13–5. Two years after last appliance worn and no noticeable change in that period.
17–9 Dentist reports he appears as at age 13–5.

Five years after the removal of the last appliance the residual arch breadth increase is for $\underline{6 \mid 6}$ 1.5 mm. and for $\overline{6 \mid 6}$ 0.5 mm. according to the available evidence.

The residual arch breadth changes are approximately the same as, or rather less than, what might be expected to occur naturally without treatment over a rather greater length of time (1). (Cf. Case 3 in (1)).

The average arch breadth increase (3) for males is :—

$\underline{6 \mid 6}$	...	1.13 mm.	Age 8–13, a period of five years.
$\overline{6 \mid 6}$	...	.84 mm.	

These figures were obtained by the statistical method ; for $\underline{6 \mid 6}$ they may be low.

Fig. 5.—Case 512. F. Age 9.

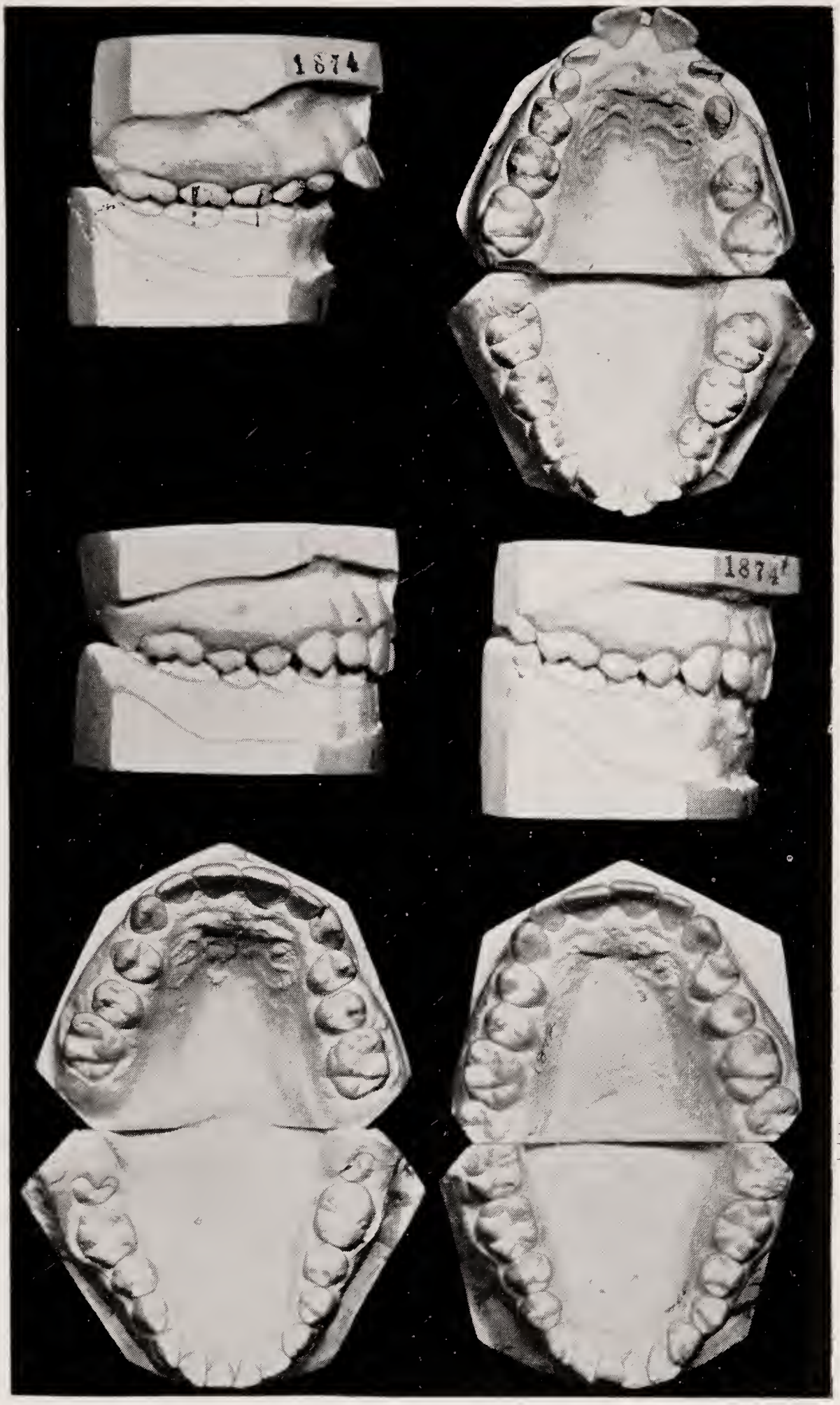
Postnormal relation of lower to upper arch with normal sized lower arch, and upper arch only slightly narrower than the lower one to correspond with the mandibular postnormality.

Result of treatment very good.

(Chapman, Harold : *Trans. 1st International Orthodontic Congress*, 1926.)

1874
F.6-11

1874
F.6-11



1874D
F.10-8

1874F
F.12-4

1874D
F.10-8

1874F
F.12-4

Fig. 6.—Case 1874. F. Age 6–11. Class II, Div. I (Angle), Class III (Bennett), includes all four types of irregularities.

Models.	*Age.*	*Increase of arch breadth cf. with original breadth.* $\frac{6 \mid 6}{}$	$\frac{}{6 \mid 6}$	*Appliances have been removed years.*
1874	6–11	—	—	—
1874D	10–8	5 mm.	3 mm.	†
1874F	12–6	—	—	1 10–12
1874H*	13–1	2.75 mm.	1 mm.	2 5–12

* Not illustrated; the upper and lower incisor imbrication is a little worse than seen in 1874F, age 12–6.

† Immediately after removal of appliances.

The residual arch breadth changes are approximately the same as might be expected to occur naturally without treatment.

This case has smallness of the maxillary bases sufficient to prevent the perfect alignment of the incisors being maintained, but not perhaps sufficient to demand extraction as part of treatment. The reduction of arch breadth after removal of appliances is accompanied by increased overbite and marked imbrication of lower incisors, and some imbrication of the upper incisors which is disappointing. No relapse of the post-normality.

A similar case but with good maxillary bases is shown in Fig. 5, and another similar case but with markedly small maxillary bases is shown in Fig. 7.

The average arch breadth increase (3) for females is :—

$\underline{6 \mid 6}$ ... 2.38 mm.

$\overline{6 \mid 6}$ ... 1.57 mm.

} Age 8–13, a period of five years.

These figures were obtained by the statistical method ; for $\overline{6 \mid 6}$ they may be high.

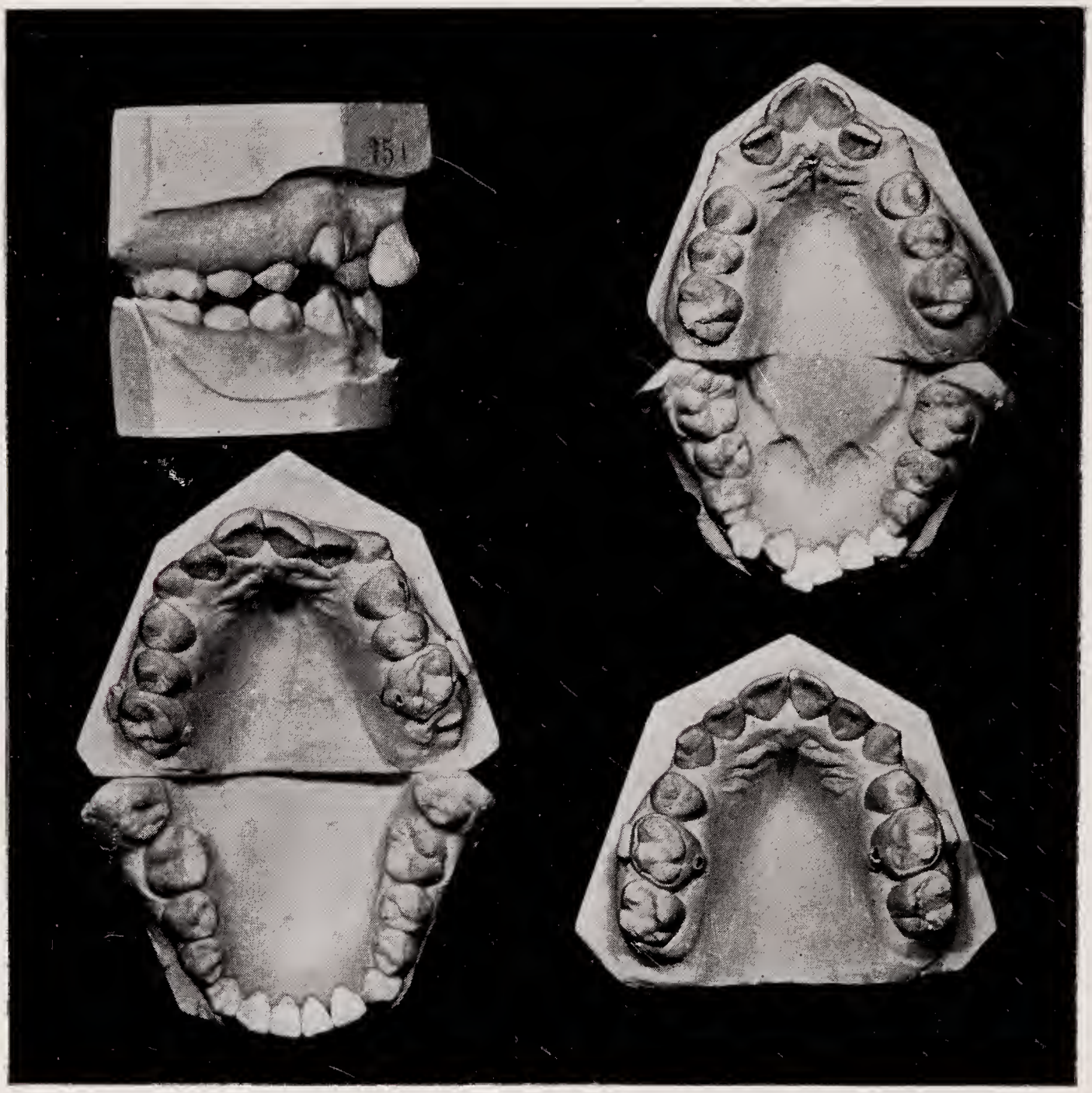


Fig. 7.—Case 751. F. Age 8–9.

An example of Class II, Div. I, with marked smallness of the maxillary bases. Treatment without extraction at first, but result unsatisfactory, and $\underline{4 \mid 4}$ removed which permitted good alignment of the upper teeth to be obtained.

(Chapman, Harold : *Trans. British Society for the Study of Orthodontics*, 1928, p. 19.)

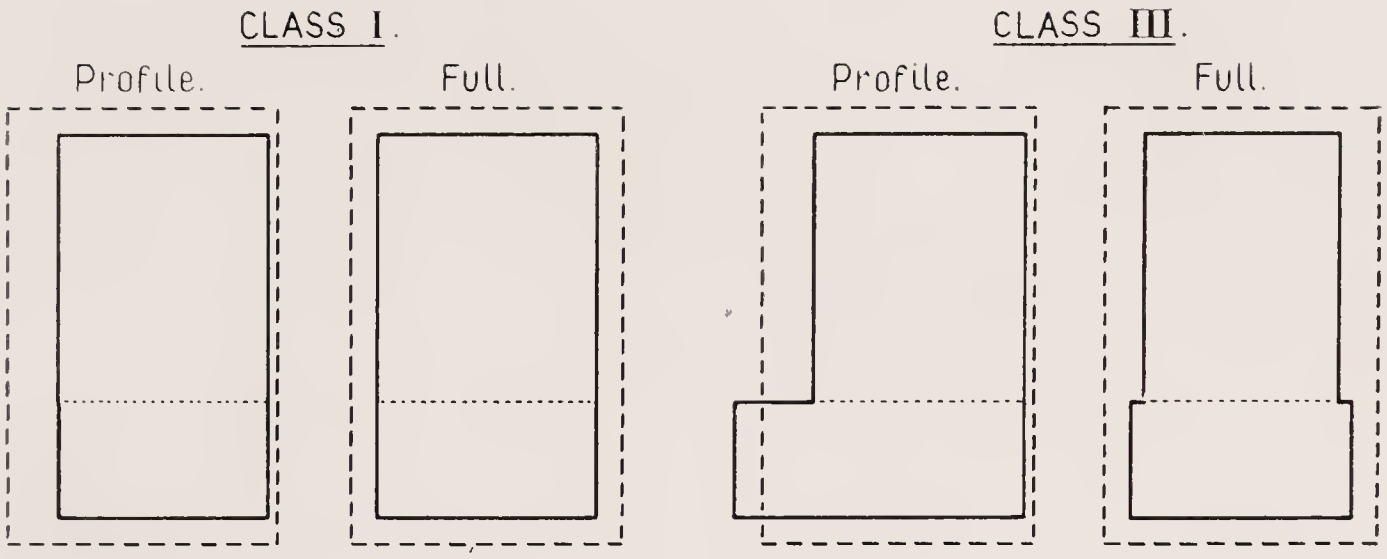


Fig. 8.

Diagrammatic representation of the probable development of the masticatory face, in the Angle Classes (complete line) compared with the normal (broken line).

In each class the masticatory face is taken as being too small, i.e. the dental arches correspond with the arches in the lower row of Fig. 1.

Where the two vertical lines all but coincide on the right hand side of the profile diagrams they are to be read as coinciding and passing through the external auditory meatus.

The broken transverse line within the figures represents the plane of occlusion (between the upper and lower teeth).

Class I.—Reduction of the masticatory face in all three planes.

Class II, Div. I.—Profile.—Postnormal relation of the mandible to the maxilla ; mandible short ; depth of basal portion of mandible insufficient, hence excessive overbite.

Full face.—Narrowness may be so slight that the arch breadth is almost normal. See Fig. 1.

Class II, Div. II.—Profile.—Considerable shortening ; postnormal relation of mandible to the maxilla ; mandible short ; excessive overbite.

Full face.—As in Class II, Div. I.

Class III.—Profile.—Prenormal relation of the mandible to the maxilla; maxilla short ; mandible long.

Full face.—Maxilla often narrow and mandible normal.

Discussion.

The PRESIDENT said that this paper by Mr. Chapman had been a very fascinating one and had raised many new points. For his own part he felt that he had to see the paper in print and to read it carefully before he could contribute effectively to any discussion. But no doubt there were others who would have grasped it better than himself.

Mr. GEORGE NORTHCROFT said that Mr. Chapman had had an opportunity for some years of watching the results of his treatment, and he had the honesty of mind and courage to say that he had made mistakes and to point out exactly where those mistakes had occurred. He did not know that he was prepared to go all the way with Mr. Chapman in saying that postnormal occlusion could not be treated by removable appliances. He thought there were certain cases that had been satisfactorily treated in that way, although he agreed with him that as a matter of choice he would use inter-maxillary traction. Some cases were extremely difficult to treat in that way, and he found they could be treated successfully otherwise. On the question of over-bite he did not think that Mr. Chapman had stressed quite enough that the downward growth of the antra was just as important as the lack of vertical growth at the back of the mandible. Excessive over-bite was produced by the shortness of the maxillary cheek teeth just as much as by the shortness of the mandibular cheek teeth. Sir Frank Colyer had remarked that Mr. Ackery had tried again and again to raise the bite by elongating the molars, but they always reverted. That was one of the reasons why he generally elected to try to depress the incisors in treating over-bite instead of raising the molars.

Dr. E. S. FRIEL said that he had gathered that Mr. Chapman thought orthodontic work to be in a state of chaos, and certainly from the point of view he had advanced in his paper the speaker was inclined to agree with him. It was not, however, their treatment which was in a state of chaos, so much as their knowledge of growth and development. The point he had tried to stress in an earlier Paper to which Mr. Chapman had referred was that normal growth ought to be taught rather than the teaching of appliances. There were a great number of appliances, but they all had the same principle and they all tried to get the same results by using pressure. He thought that was where, according to Mr. Chapman, they were in a state of chaos. It was true that a great number of cases would not respond to treatment, but that was found in every department of medical science. That was no reason why they should not start thinking out the best method of approaching these cases. The improvement in cases of irregularity depended to a great extent, not upon the orthodontist's procedure, but upon the effect of time. If obstructions could be removed very often natural growth was given a chance, but quite a number of postnormal cases were prevented from curing themselves by the rotation of the premolars and a slight lateral contraction. By just rotating the molars and widening the upper arch it was possible to render the conditions such that the case cured itself. During the previous summer he had been in Oslo and there had seen several cases where the lower jaw had come forward at least 2 mm. without any apparatus on that jaw at all. He believed that the principle to be followed in orthodontics was to try and give nature a chance of growing. Sometimes nature took the chance and at other times it did not. He felt that bite plates were a waste of time. Mr. Chapman had spoken about two types of Class II. He thought there was still another type of Class II case, namely, where one found an excessively wide upper and lower jaw. These cases all relapsed, and he would much prefer to see a narrow upper arch than an over-growth of the arch.

Mr. H. G. Watkin said that he agreed with nearly all that Mr. Chapman had said. With regard to over-bite, he thought that plates were of very little use. If the person took the plates out while eating, even though he had them in for the rest of the day, what was the value of that? With regard to expansion they all knew that there was a certain amount of natural growth which brought about expansion. If cheek teeth were expanded artificially when the appliances were removed the condition relapsed. He agreed with Dr. Friel about reducing the over-bite by pushing forward the lower incisors. It was far preferable to reduce over-bite by pressing down the lower incisors and pushing the upper incisors upward, than by dealing with the cheek teeth. With regard to Class II cases, it was true that relapses were often seen. If the lower lip was a functional one and came in front of the upper incisors there would be less chance of relapse and the patient would look respectable.

Mr. Bulleid said that the thing which emerged from the paper and the discussion was that orthodontics was most definitely an art and by no means a science. The fact of the matter was that no laws to which they could refer governed it, and several speakers had put their finger on the point when they said that the laws governing growth were not yet properly understood. Until they were, the art would remain an applied art and not a science. Following on this he thought it could be said that the only thing which was of any value to the orthodontist was experience, and this was certainly what Mr. Chapman possessed. He himself had in a small way practised orthodontics for a number of years, and in the main he was inclined to agree with what Mr. Chapman had said, though he did not agree entirely. The curious thing about it was, that, as far as he was able to see, the growth and development of the jaws was no means regular or systematic. What he meant was this, that a case might be started and would be found to respond very well for a time and then the orthodontist seemed to come up against a blank wall. On the other hand, he might treat a case and get an excellent result which would last quite a number of years, and then, suddenly, for no reason that could be seen, the whole thing relapsed and went back more or less to the original condition. He was not sure about Mr. Chapman's Class I cases. He was inclined to think that he himself had treated Class I cases by expansion and had got permanent results. He wished to know whether Mr. Chapman thought that the lack of development in the posterior part of the mouth was in the basal portion of the bone and not in the alveolar portion. His own impression was that the lack of growth was in the alveolus. In this connection he differed from a number of speakers who had expressed disbelief in the bite plate. He found the bite plate, if wisely used, of great value. Cases of excessive over-bite if treated at about the time of the eruption of bicuspid teeth did respond very satisfactorily. They showed an actual growth of the width of both jaws. He did not know why this happened, but in his experience it did happen. He felt that until the science of genetics had advanced much further, they were likely to have to depend entirely on empirical knowledge and experience in getting their results. One got to know, somehow or other, when looking at a case that one could get a result, whereas the next case one saw one very likely felt that a result would be impossible. Dr. Friel had mentioned a Class II case. In such a case he had come to the conclusion that nothing could be done, that there was a hereditary factor concerned against which they were powerless.

Mr. H. C. Visick said that Mr. Chapman had spoken about some of these cases being due to lack of basal bone. On what grounds could it be said in a particular case that the condition was due to the basal bone being too short? He took it that nothing could be done about it if it were found to be too small. He was not quite sure whether he understood Mr. Chapman to say, in showing a case where the excessive over-bite had lessened without any treatment, that they would have been pleased to have achieved that result with appliances. Did he think that all excessive over-bite got better as time went on? That was not his own experience. He had seen many patients beyond the age of childhood in whom the excessive over-bite was a dreadful thing, the incisors impinging on the gum and making it sore and inflamed. He had no hesitation in promising to reduce the over-bite in almost every case, if the patient was anything like under control, and he did this by means of a bite plate. He was not quite sure whether Mr. Chapman advocated trying to reduce the over-bite even though the improved effect was lost again, or whether he thought it was not worth trying. The speaker's view was that with a properly made bite plate, a bite could always be improved.

Mrs. Michaelis desired to ask one question with regard to the extraction of premolars, and that was whether Mr. Chapman had any preference for their extraction in the erupted or the unerupted state. As regards bringing forward the lower jaw without any intermaxillary traction, she, too, thought it quite impossible. As regards Class I cases never being treated without extraction, she would not like to think that that was absolutely true. Would not Mr. Chapman modify that at all as regards age? After the eruption of the premolars she did feel that that was quite impossible, but she thought that she had several cases where she had practised expansion while the patient was quite young and there had been a very good result afterwards, which had been maintained for quite a number of years. Possibly Mr. Chapman would say that these were cases which nature would have expanded in any case.

Mr. Robert Cutler said that when Mr. Chapman got talking on a subject like this, many of them listened with a sinking feeling lest a case with which they themselves had struggled for many years ago should have fallen later into his hands and could be cited by him as an example! The point that he had raised about the possibility of curing Class II conditions by removable appliances was interesting, but Mr. Chapman to a large extent saw the cases which represented the failures of other practitioners, therefore it would naturally be his impression that Class II cases were, as a general rule, not successfully treated by removable appliances. The successful cases, of course, he did not see. There were undoubtedly a large number of Class II cases which were quite successfully treated by removable appliances. It was, however, quite an important point when he said that fixed appliances gave a very much more efficient control of forward movement and if the case was just hanging in the balance, the more efficient control exercised by the intermaxillary traction would enable one just to snatch a success. The problem was to get a forward movement of the lower jaw, and by means of the intermaxillary force exercised by fixed appliances, a relatively efficient forward movement was obtained. But if use were made of an upper anterior biting incline on a removable appliance, the lower incisors impinged on the incline, and if the child had good muscle tone the contraction of muscles in biting did bring about this same forward movement of the lower jaw. If the incline were badly shaped as had been described, or if the muscle tone of the patient was not what it should be, then the

appliances using such an incline would fail where intermaxillary traction would probably bring about success. That, however, was no indictment of removable appliances in a suitable case.

Miss K. C. Smyth asked whether the classification given by Mr. Chapman was based on Sir Norman Bennett's classification as set out in the book in which he and Mr. Chapman collaborated. She believed the first and second class were almost identical with those in the book. and the third and fourth seemed to be included in Sir Norman Bennett's third class. With regard to the bite plate, she herself had not been as fortunate as Mr. Visick, but she had found a use for the bite plate where she had wanted to align the lower incisors, move them forward, and depress them. Where there was a very close bite already present, and the incisors were actually sunk into the tissues behind the upper teeth, it was very hard to carry out the movement of these lower teeth without disturbing the gums still further, but by using a bite plate in conjunction with the treatment of the lower incisors the gum tissues had been protected and treatment facilitated.

Dr. C. B. Henry asked if Mr. Chapman had any satisfying reason for his optimism in treating Class II cases. Had he an ætiological argument or was it a matter of clinical experience ?

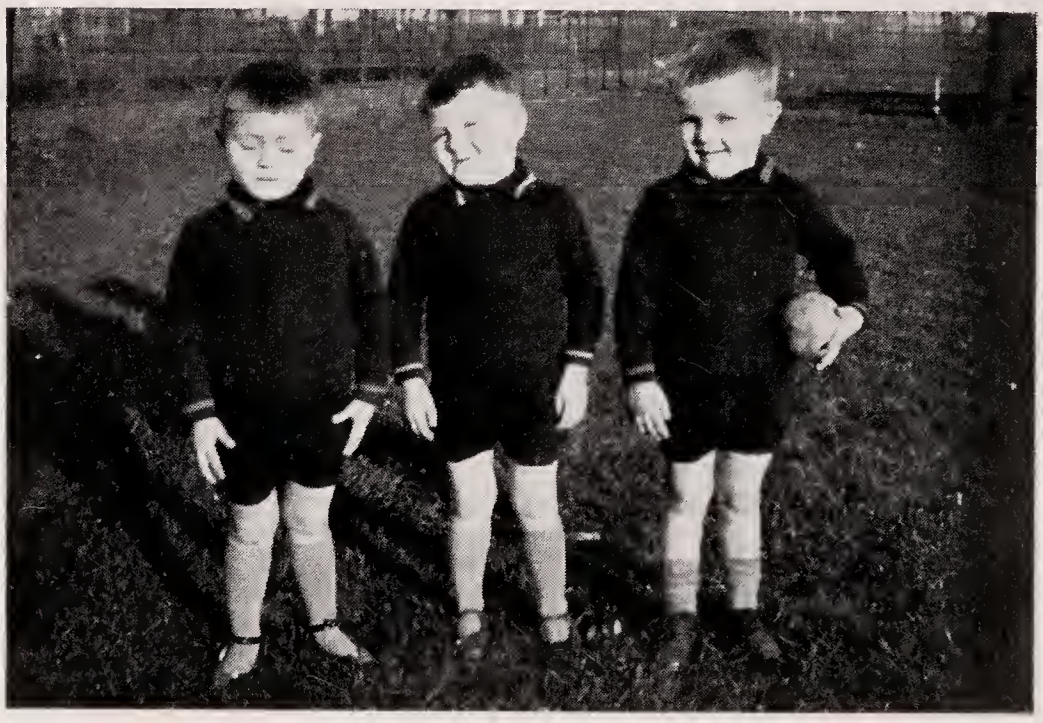
Mr. Harold Chapman in reply said that if he were to deal with all the problems that had been raised it would take far too much time. He had intended to be depressing, and he was glad he had been successful. The point he wished specially to bring home was the fact that all these things which were done with appliances (Mr. Cutler spoke as if he, Mr. Chapman, had never tried a vulcanite plate) also happened without the use of appliances. Therefore, how did they know that their appliances had achieved the result ? The case he had mentioned which had widened by 4.5. mm. was one which he would have been pleased to show as a result of treatment with apparatus, but in fact it was achieved without apparatus. He had models of children between 4 and 6 years and between 8 and 14 years of age where the bite had opened and the overlap of the incisors had become less. Again, forward movement of the mandible was normal: it was one of the first of these normal changes that he investigated and he showed that the lower teeth did move forward in relation to the upper ones. He always tried to give himself a satisfactory reason for the things he was doing, and he imagined that by the use of rubber bands (intermaxillary traction) he caused some change at the neck of the condyle which, if continued long enough, had a permanent effect : intermaxillary traction must be used *continuously* for 3 to 4 years if the mandible were to remain permanently forward. He could not conceive how a vulcanite plate could bring about that result (except in a few exceptional cases) in a typical Class II Div. I. case. He could recall only two cases that appeared improved as regards the position of the mandible as the result of vulcanite plates, but he knew of many where the result was—well, a failure. Mr. Cutler had asked a question about rubber bands. In all these matters there were exceptions. If it was known that there was someone looking after the child who would see that the rubber bands were put back, he did not mind them being removed for meals. He also took great care in every case as to the extent to which the rubber bands stretched : he knew that the pull exerted was about 2 ozs. in all cases, and never exceeded 3 ozs. Mr. Visick had asked if he could promise to open the bite. Yes, he could promise that, but not that it would remain open, which was a very different story. One thing that Dr. Friel had said was very important. Dr. Friel had carried out a good deal of investigation as regards the angle of the Frankfurt plane. He saw this perhaps a

little differently from the way the speaker saw it, but it did show the value of this research. He agreed that Division II cases were a different problem, some of these cases did come forward without intermaxillary traction. One heard the back teeth sometimes spoken of as "short" when there was excessive over-bite; the speaker imagined that it was intended to convey the idea that the teeth had not erupted sufficiently, or were relatively shorter than the anterior teeth: it might be one way of accounting for the condition, but he (Mr. Chapman) did not think it arose in that way. He said that he had not any experience concerning the removal of the premolars before eruption, but he was quite prepared to believe that that would give a better result, though generally he advised the other course, because it did not make much difference in the result and it involved a reduced risk. With regard to pressing the incisors down, he never tried to do that. What was happening when one depressed these teeth? Did one cause an absorption of the roots of the teeth? Such absorption might serve them in very good stead, and when it held it gave scar tissue which retained the teeth in their new positions. He suspected that was the basis of some successful treatments, namely, that the teeth became ankylosed to the bone. He believed that Mr. Cutler and he were in agreement, but if he had a Class III case before the age of 12 he believed he could cure it. There might be cases which relapsed, but he could not say that he had seen them.

A vote of thanks was accorded to Mr. Chapman.

On the Mouths of Triplets*

By S. B. Newton, L.D.S.Eng.



John. Michael. Peter.

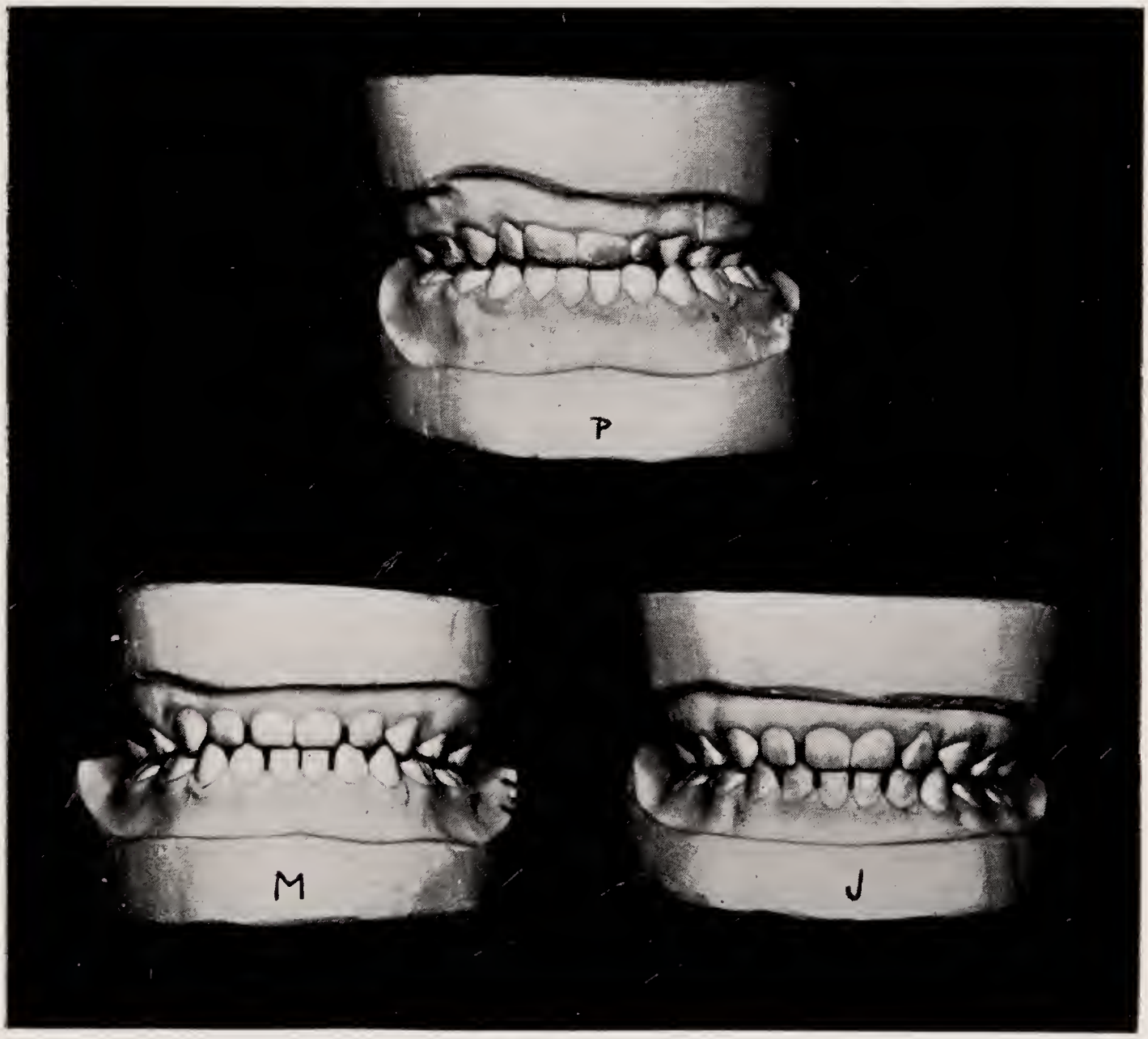
At a residential school I have recently had under my care triplet boys, aged four and a half years. They belong to a family of thirteen

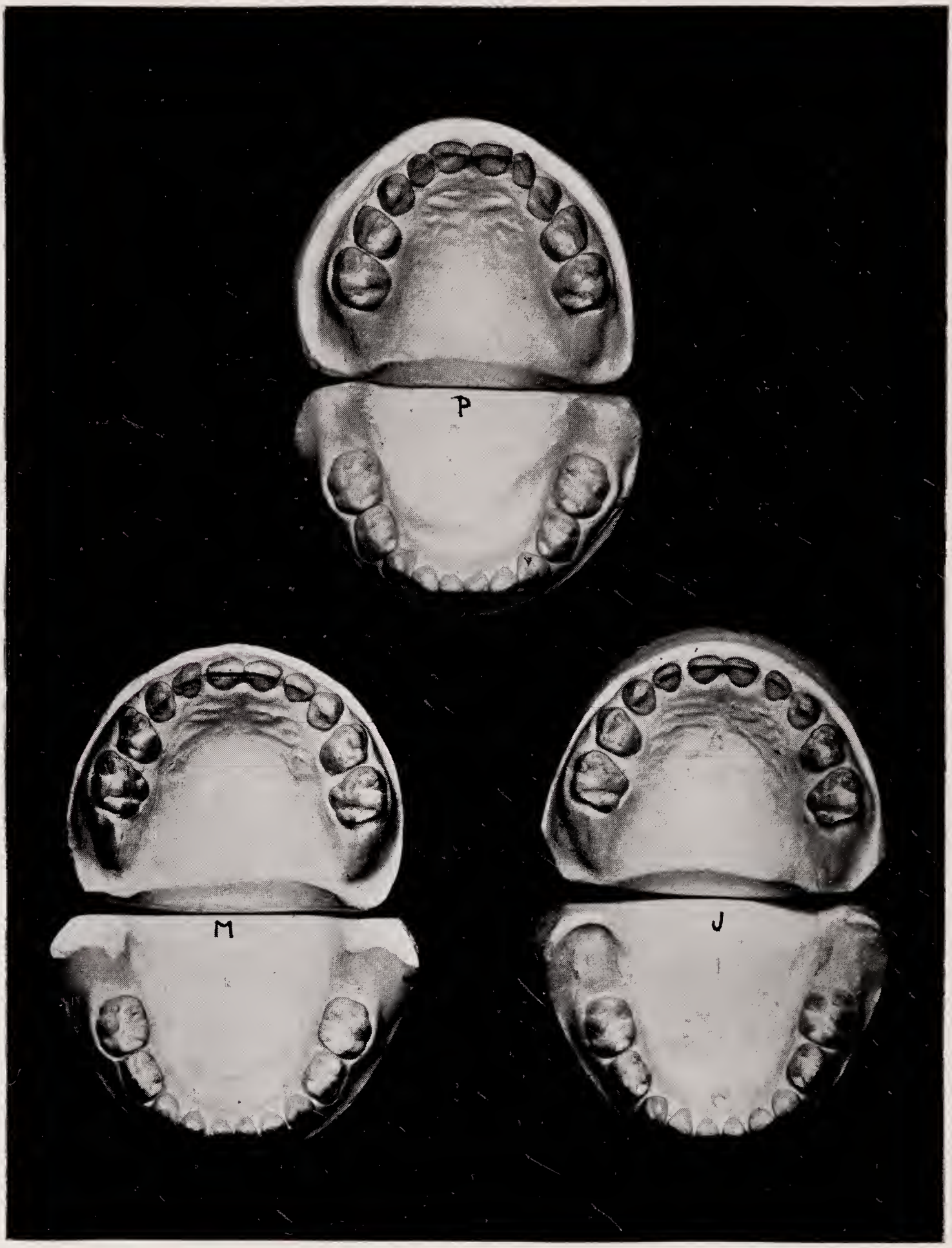
*Read before the Society, March, 1937.

in which there is one child younger than they. They are quite vigorous youngsters and above the average intelligence. Two of them are very like in appearance and are no doubt uniovular twins while the third is bigger, differs in many ways from the other two and is doubtless the result of the fertilisation of a separate ovum.

Our kind friend, Mrs. Lindsay has been unable to find any literature on the subject of triplets, but I am indebted to Professor Gilmour, who lent me a reprint of a paper written by Dr. Samuel Goldberg of Chicago, entitled, "A Study of the Dental Arches of Identical Twins."

He made a research into the dental arches of fifteen pairs of twins and found that "the corresponding sides of the twins are more alike than the opposite halves of either individual," and this, he says, held true for every pair that was free from dental mutilation, and I think the cases we have before us bear out his findings. Taking impressions of the boys' mouths was not too easy and plaster ones were out of the question. The models of the like two are practically identical and the upper of the one will articulate with the lower of the other. And also these two show quite normal dental development for children of their age, while the teeth of the third child are crowded and on the left side the upper | CDE are in lingual occlusion to the corresponding lowers.





See also page 72.

In the like two the spacing of the upper incisors is practically the same. The A | A are touching in both cases, the | B has a space on either side and the B | has a space mesially.

There is not the similarity of form in the molar teeth that might be expected, but the first molars in the twins are much more alike than the second molars and all these teeth differ from those in the third boy. The like two are quite free from caries but I have had to fill a small cavity in E | of the other boy.

One would expect in two such similar upper jaws that the palatal rugæ would be alike but this is not the case although there is some similarity, while the rugæ of the third child differ entirely from the other two.

Not having the necessary instruments for making proper anthropometric measurements of the heads I have contented myself by measuring round the heads from the forehead to the occiput and in the like two this is 49 centimetres and the third boy measured 54 centimetres.

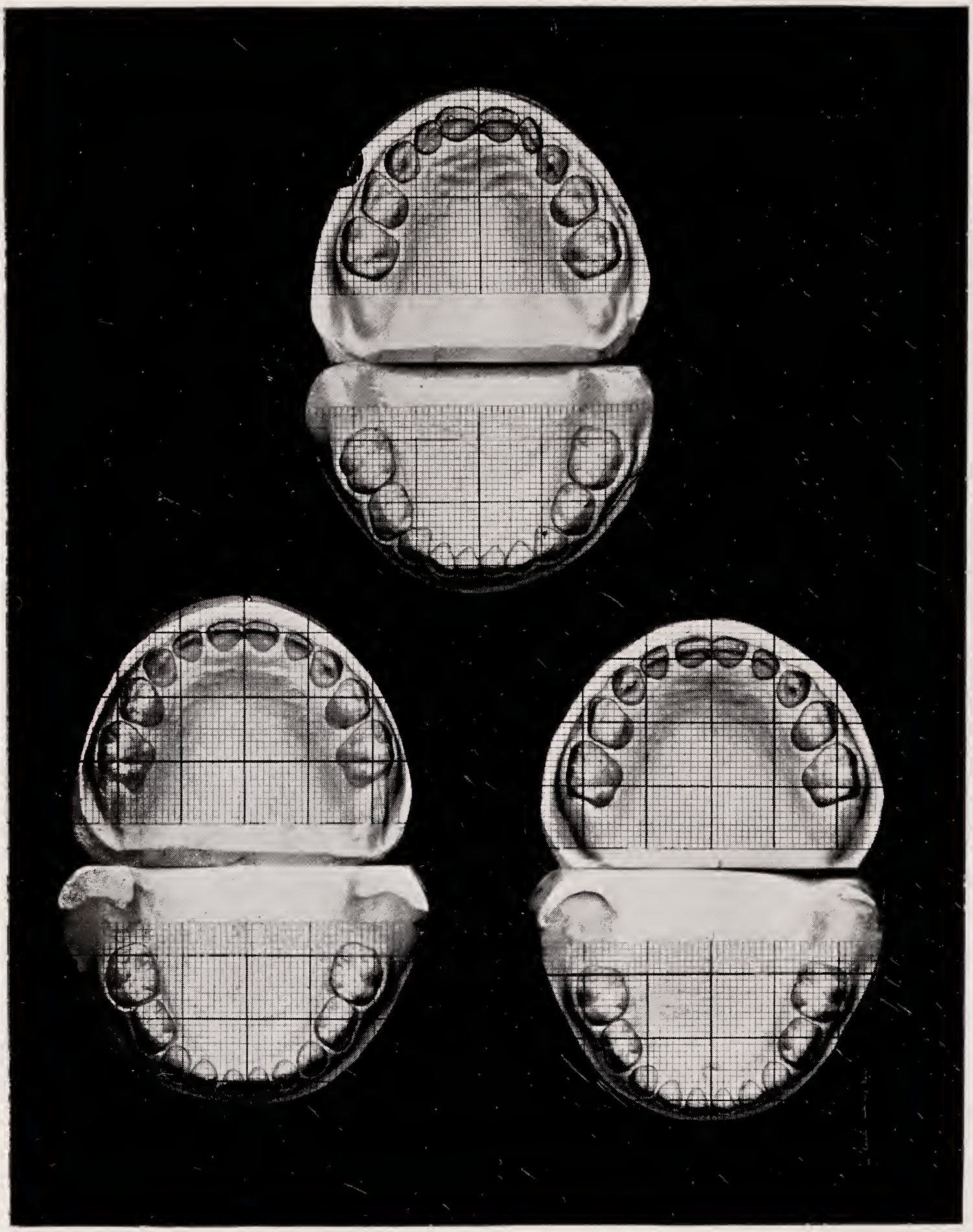
Fingerprints were taken of the boys but they are not very good and there is no sign of similarity in them as far as I can ascertain.

I have also noted the following points :

	John	*Michael*	*Peter*
Height	$37\frac{1}{4}$in.	$37\frac{1}{4}$in.	$38\frac{1}{2}$in.
Weight	37lbs.	37lbs.	41lbs.
Hair	Brownish	Brownish	Brownish
Eyes	Hazel	Hazel	Blue
Handedness	R	R	R
Footedness	R	L	R
Handclasp	R over L	L over R	R over L
Crown Hair Whorl ..	Clockwise in all three.		

Width between teeth measured lingually at the cervical margin in millimetres :

Maxilla	*John*	*Michael*	*Peter*
C | C ..	21	21	19
D | D ..	25	25	22·5
E | E ..	29	28·5	26
Mandible ..			
C | C ..	17·5	17·5	16·5
D | D ..	22·5	23·5	23
E | E ..	28	28	28



Millimetres.		*John*		*Michael*		*Peter*	
Maxilla		L.	R.	L.	R	L.	R.
Width	A	6	6	6	6	7	7
	B	5	5·5	5·5	5·5	6	5·5
	C	6	6	6	6	7	7
Length	D	7	7·5	7	7·5	7·5	8
	E	9	9	9	9	9	9·5
Total		33	34	33·5	34	36·5	37
Mandible							
Width	A	4	4	4	4	4·5	4
	B	4·5	4·5	4·5	4·5	5	5
	C	5	5	5	5	5·5	5·5
Length	D	8	8	8	8	8	8
	E	10	10	10	10	10	10
Total		31·5	31·5	31·5	31·5	33	32·5
Total of both jaws		64·5	65·5	65	65·5	69·5	69·5

Results of Early Extractions*

By Kenneth Pringle, L.D.S.Eng.

An examination of the original models of the 850 current orthodontic cases under the treatment of Mr. F. Bocquet Bull at Guy's Hospital was carried out in February and March 1937. The demonstrator brought forward the following findings :—

Local Tooth Movement Following Early Extraction of Temporary Molars.

(1) Seventy per cent of all cases showed early loss of lower temporary molars or/and canines.

(1a) Fifty-three per cent of these cases had lost a half a unit space or more.

(2) Fifty-four per cent of all cases showed early loss of upper temporary molars or/and canines

(2a) Seventy-six per cent of these cases had lost half a unit space or more. (The width of a premolar is taken as a unit.)

* Demonstration meeting of the Society, 1937.

Alteration or Appearance of an Alteration in Arch-relationship due to Early Loss of Teeth; Particularly Lower Temporary Teeth.

(3) Six per cent of all cases showed an established (apparent or pseudo-) prenormal arch relationship and a further four per cent of all cases showed a tendency to prenormal arch relationship.

(4) Eight to thirteen per cent of all cases showed an appearance of postnormal arch relationship.

(5) Forty-four per cent of all cases showed a closing of the bite. (This figure represents the demonstrator's own opinion, each case having been taken separately.)

As evidence of the tendency of the bite to close following early extraction of temporary molars, figures were shown as follows :—

The Degree of Incisor Overlap in Cases of Normal Antero-Posterior Arch Relationship at 7 to 8 Years Old.

	Number of cases	More than $\frac{1}{3}$ incisor overlap.
No loss of lower temporary molars or canines . . .	29.	31%
Loss of lower temporary molars or canines on ONE SIDE ONLY	21.	57%
Loss of lower temporary molars or canines on BOTH SIDES .	60.	82%

Models were shown illustrating the various conditions described.

Demonstration of Prosopometer

At a demonstration meeting of the British Society for the Study of Orthodontics on May 3rd, 1937, Mr. George Northcroft demonstrated the original prosopometer, designed by Dr. J. Sim Wallace in 1909, and his own elaborated design of 1910, which was adapted for measuring the antero-posterior position of the maxillary or mandibular first molars, as well as the three standard measurements from tragion to prosthion, to mandibular alveolar margin, and to gnathion.

Bennett's 1926, Friel's, Campion's, and Northcroft's aluminium frame 1934, were also displayed and explained.

The vertical gauges shown included Bennett's Dakometer, Tomey's Triakometer and the ordinary engineering calipers adapted with a chin cup.

Of model measurers shown, Korkhaus's three dimensional calipers met with much appreciation.

Some Cases of DEFECTIVE DEVELOPMENT in the DECIDUOUS DENTITION *

By H. C. Apperley.

I thought it might be of interest to show a few cases of abnormal development of the deciduous dentition. I think that the dental surgeon who does not specialise in orthodontia, has a greater opportunity of seeing these cases, for he is much more likely to see a child at an earlier age, than one who does no general practice, as unless the deformity is marked, the case will not come into his or her care. This, I think, is a great pity, as I am sure that the earlier treatment can be begun, the better it is. I must admit though, that it is not always easy to persuade a parent to allow one to start as early as we should like. In the cases which I see, I have been struck by the number of children, who although of good physique, and as far as one can judge brought up in the best of circumstances, whose deciduous teeth are perfect, yet show to a greater or less degree lack of growth in maxilla and mandible. I am more than ever convinced of the truth, that if no spacing of the anterior deciduous teeth has taken place by five or five and half years of age, there is certain to be crowding of the permanent incisors.

Another deformity, which in my opinion is very common, is that caused by finger or thumb-sucking. I wish someone would tell me of an easy way to cure this habit, as I have found it almost impossible ; all the usual methods seem to fail. I know that a splint bandaged to the arm will prevent the child from thumb-sucking, but I am loth to advise this, as I am not at all certain that such a method is not worse than the habit. I think it must be due to the higher excitability of the modern child. I should like now to show some slides of cases which show deciduous abnormality.

* Read before the Society, October, 1937.

Fig. 1 shows crowding or lack of spacing in the deciduous dentition of a child of about five or five and half years of age. There is practically no spacing, although the arch itself seems to be quite well formed. The lower deciduous incisors are slightly irregular and crowded, but the width of the arch in the deciduous canine region is really quite good.

Figure 1.

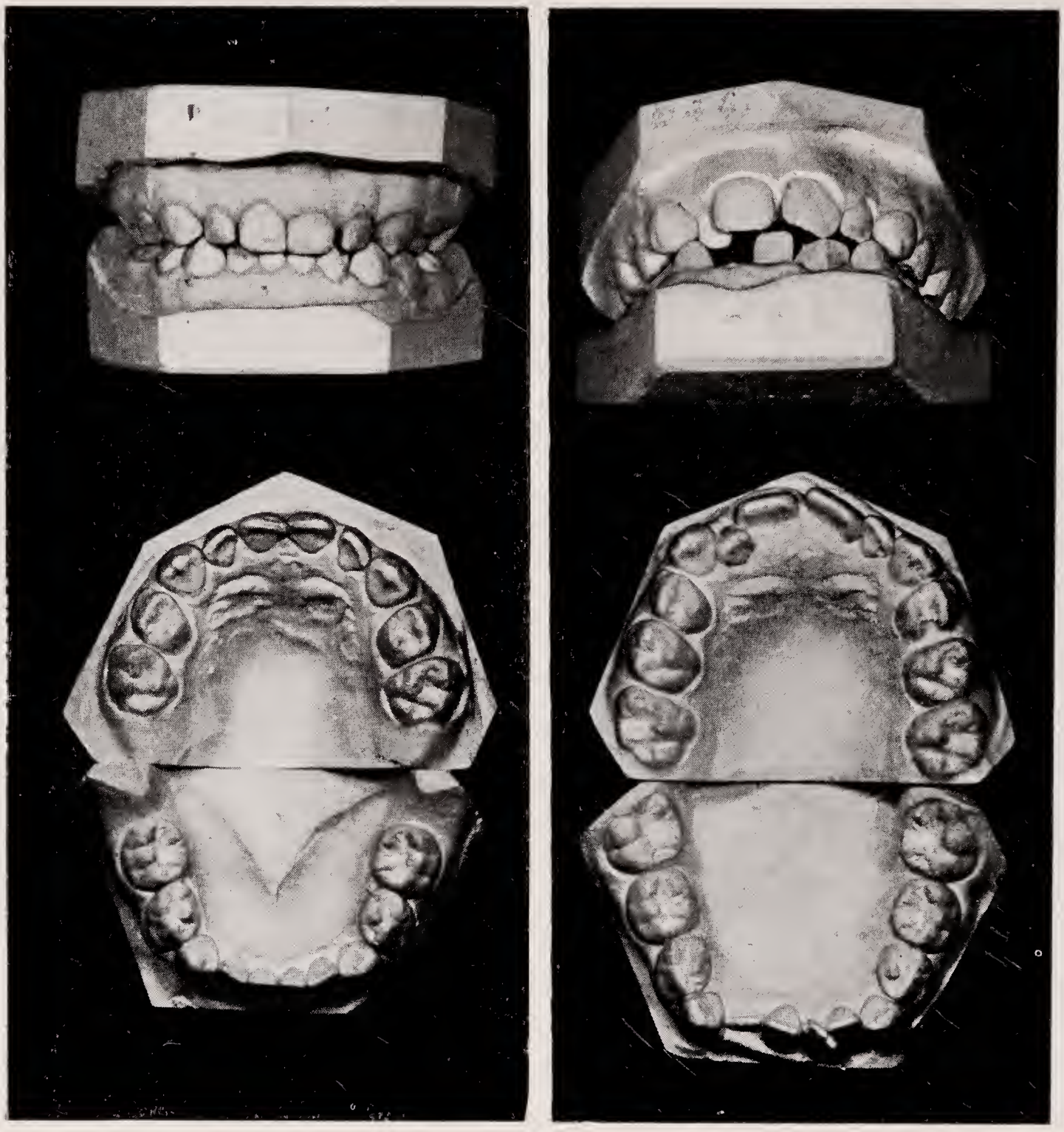


Figure 2.

Fig. 2 shows the result after the incisors have begun to erupt. There is quite marked crowding, both in the upper and in the lower. Some expansion has been done, but it was not sufficient, at the time before the deciduous incisors were lost, to prevent this crowding. Eventually the C's were extracted, and it was found possible to expand enough to get the incisors in satisfactorily.

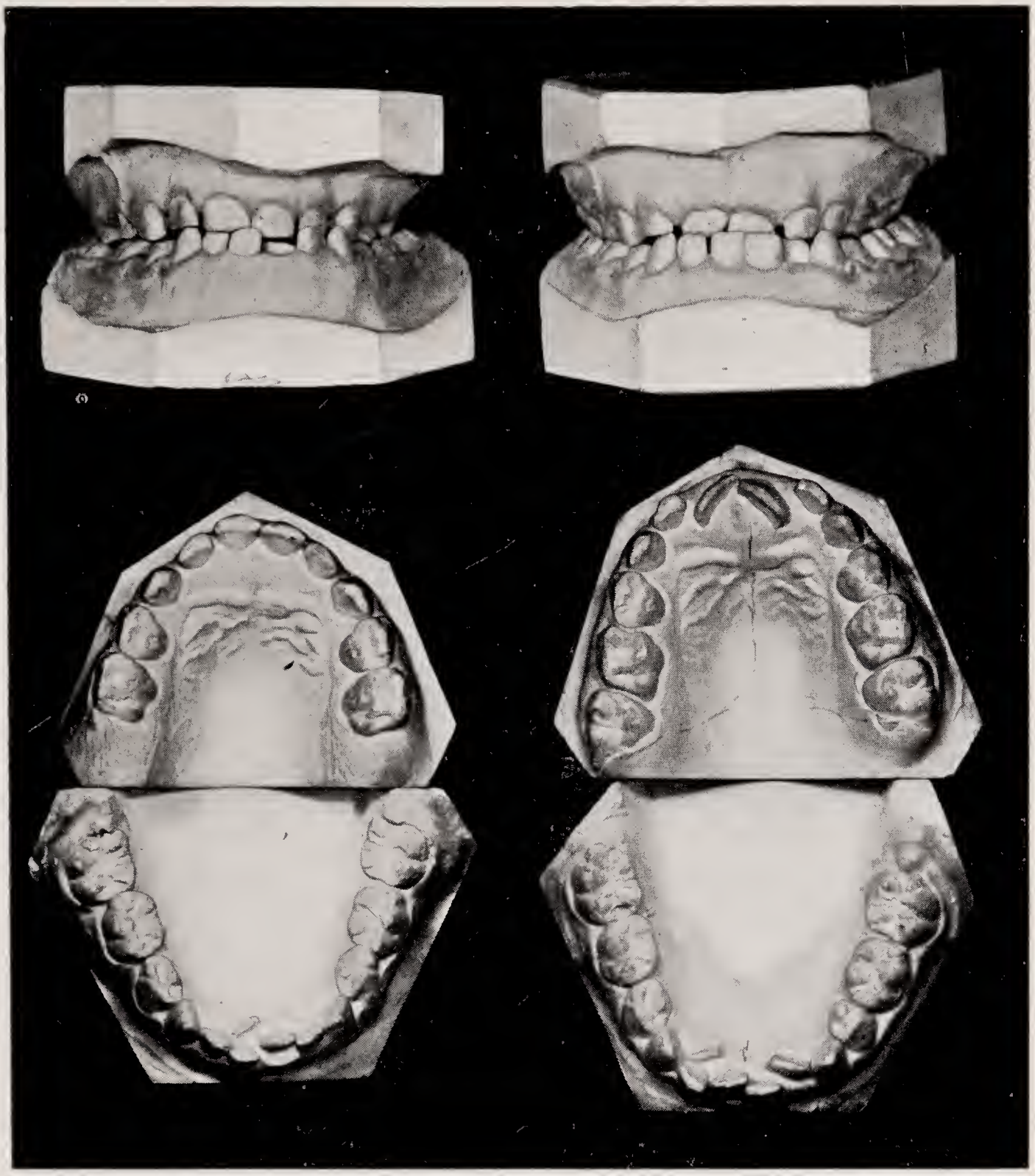


Figure 3.

Fig. 3. Not only does this case show lack of spacing, but it is a Class III case as well. When these models were taken the child was about six years of age, and there is actual crowding of the lower incisors. I do not think I have seen any case which has this lack of spacing in the deciduous dentition and which does not show crowding of the permanent incisors when they erupt. In this case the result of expansion was quite good.

Fig. 4. In this case there is crowding of the incisors and the upper temporary molars are in a lingual position. I wanted to start treatment, but the child's mother objected, so I was not able to do so. I saw the child again and I was very much surprised at the amount of normal expansion and growth that had taken place without treatment.

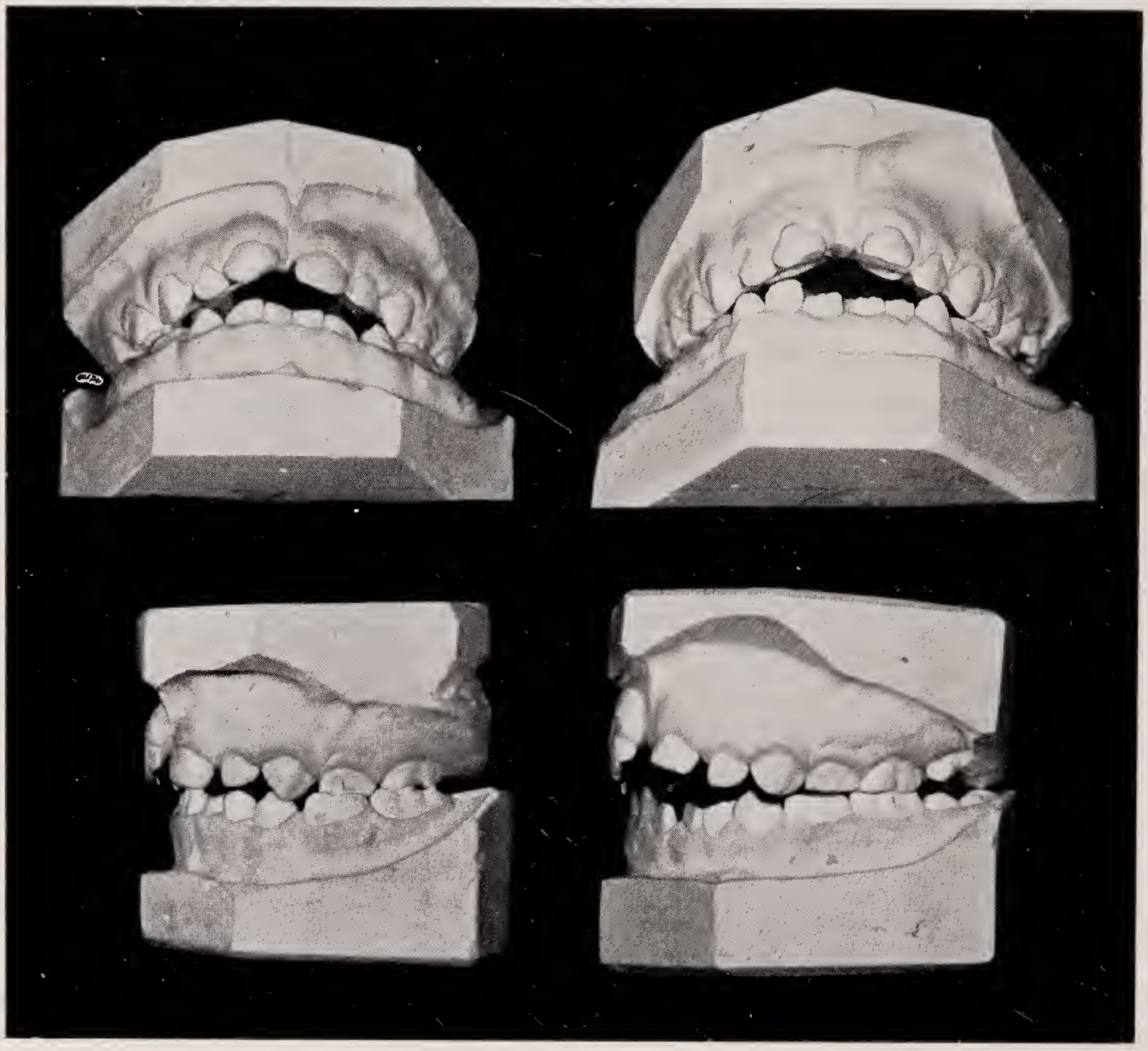


Figure 4.

Fig. 5. The two outside models are those of two brothers who have about eighteen months' difference between their ages. I went into the history as carefully as I could and found that they had been breast-fed for three or four months ; they are perfectly healthy children, brought up in the best possible way, but they are both thumb-suckers, and the result is that they are both postnormal. In the elder child there is very marked lack of room in the incisor region. He is only five-and-half years old, but I am starting treatment at once, as I think there will be even worse trouble in the uppers than in the lowers.

The other case is that of a boy about five years of age. He has practically normal occlusion, with only a slight tendency to

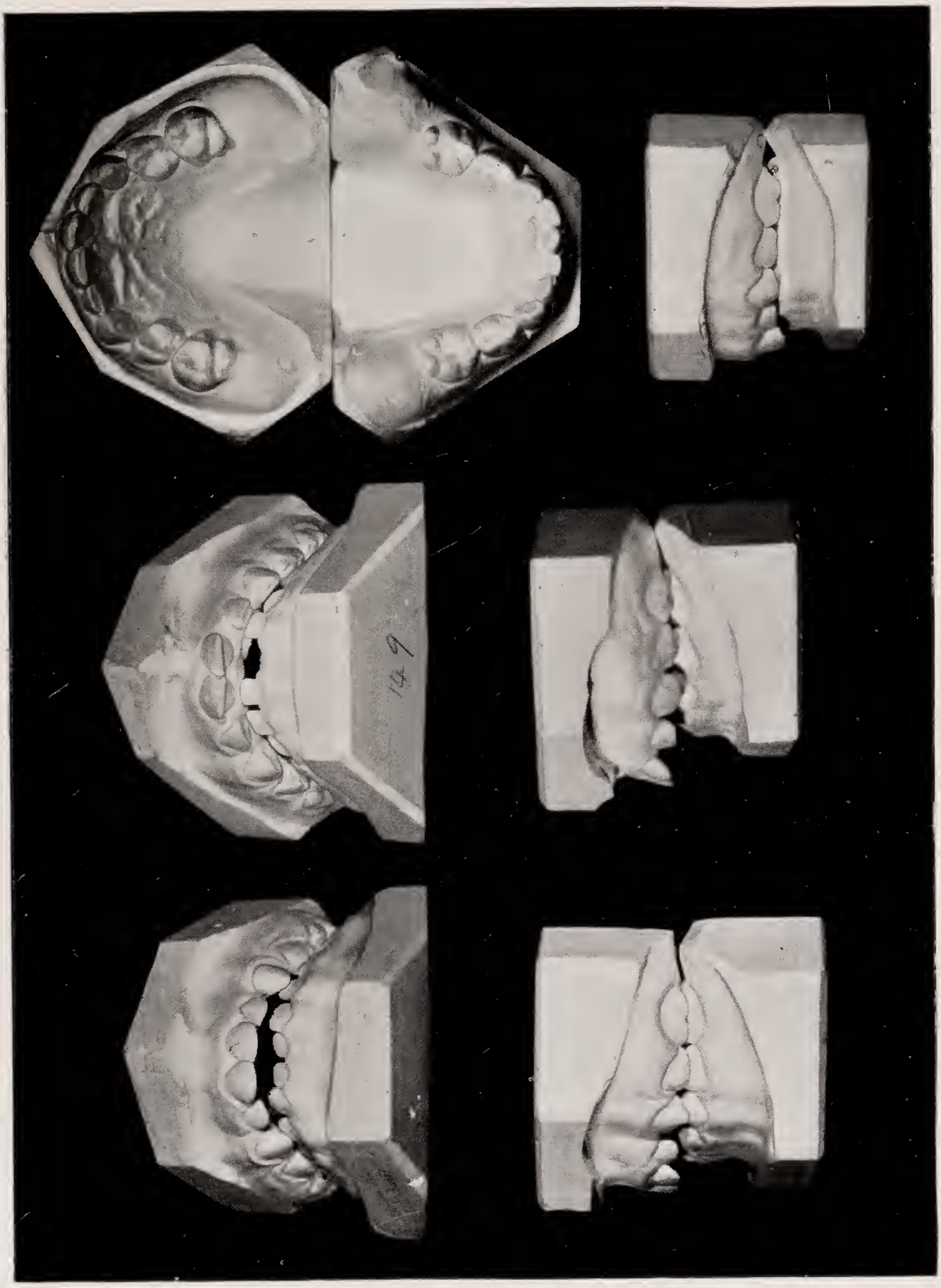


Figure 5.

postnormality, but the prominence of the uppers is very marked. I went into the history and could find absolutely nothing. The boy was breast-fed and is perfectly fit and healthy, with no finger or thumb-sucking at all. I think it is a question of heredity in this case, as the child's brother and his parents have the same sort of condition.

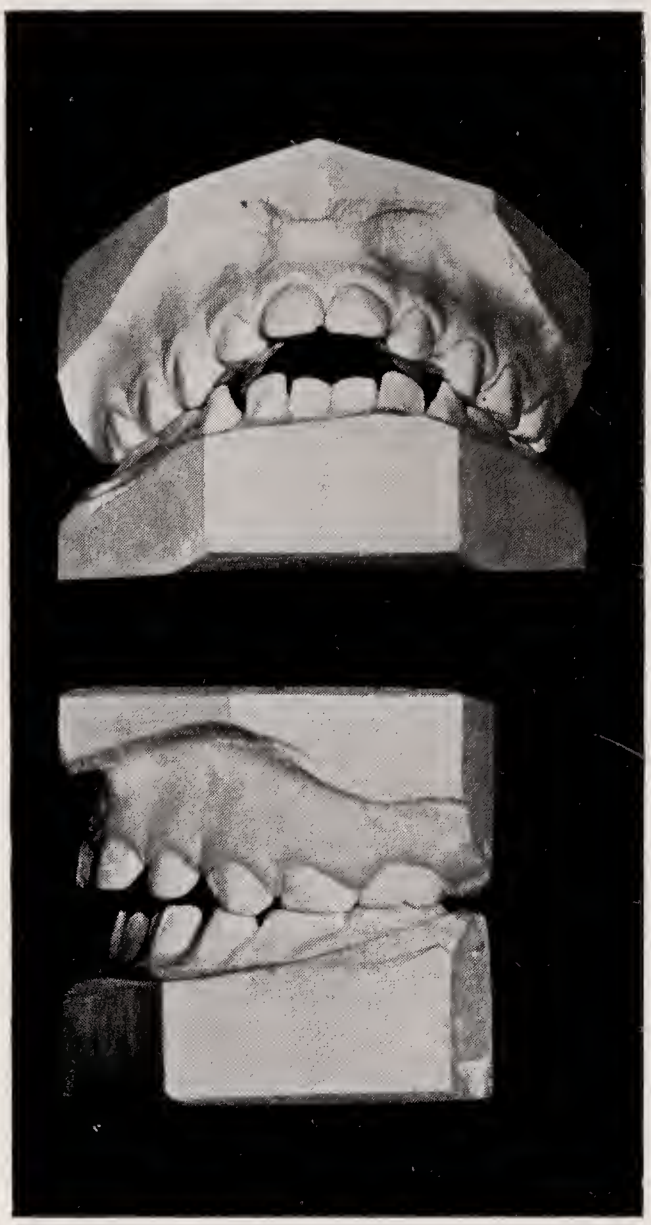


Figure 6.

Figure 7.

Figs. 6 and 7. These are two cases of thumb or finger-sucking. In one the occlusion is quite normal, but without treatment I am sure the upper and lower incisors will be crowded.

Fig. 8. This is a case of thumb-sucking and the amount of gap is very marked indeed. I think it is a most difficult question to know how to deal with these cases, because one can advise the parents to stop the child thumb-sucking at once, but it is not an easy thing to do.

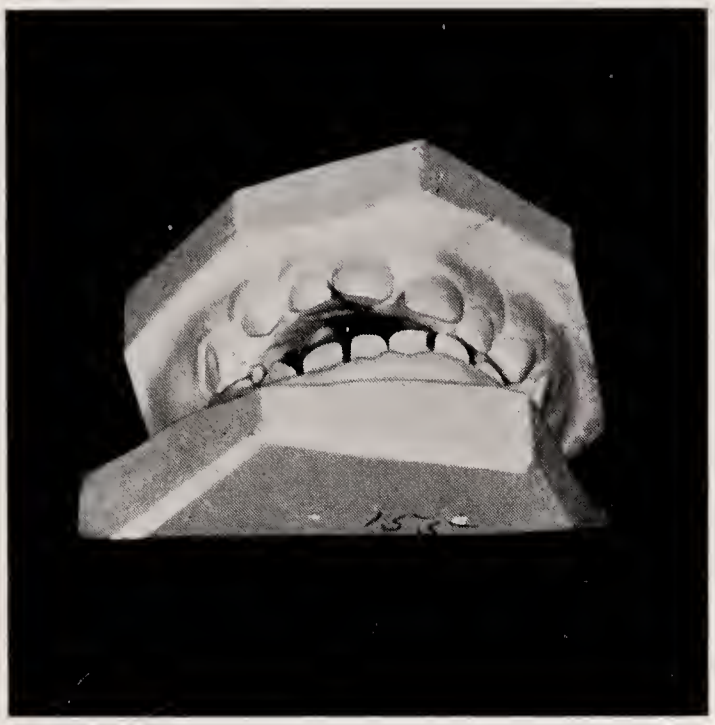


Figure 8.

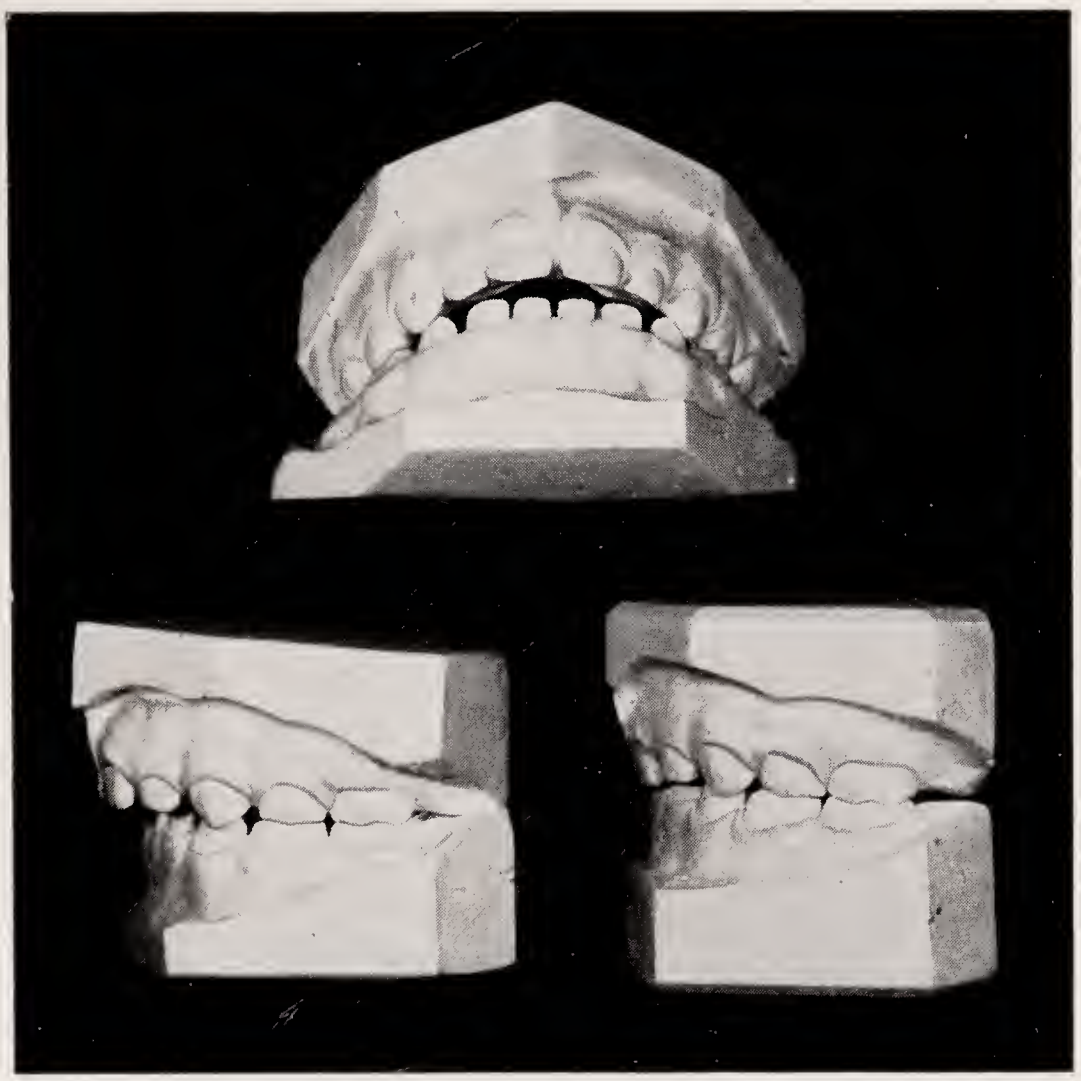


Figure 9.

Fig. 9. This is a rather interesting case, because it is a case of thumb-sucking and open-bite and a considerable amount of prominence and tendency to postnormality. I put the fear of death into the child and apparently that stopped the thumb-sucking, for the mother told me there was no future thumb-sucking, and in four months there was a great improvement without any treatment at all. The case is very nearly normal now.

Discussion

Mr. Harold Chapman, referring to Mr. Apperly's statement that if there was no spacing at five years of age the case would be abnormal, said he had come to the conclusion that there was spacing between all the deciduous teeth, at, say, three years of age, and that the spaces behind gradually closed, at any rate between the molars and perhaps between the molars and the canines. Therefore he agreed with Mr. Apperly, that, if there was not and never had been any spacing at all, the arches were too small. He did not think that Mr. Apperly need feel quite so hopeless about curing thumb-sucking. One method was to put in a plate which was divided in front ; the child need not be told why it was put in ; he could be told that it was to straighten his teeth, or something of that sort. He himself had had remarkable success in one case in which he had put in a Badcock plate ; the boy never sucked his thumb after that. He thought that very often it was better not to speak to the child about the thumb-sucking.

Mrs. M. P. Michaelis said that she agreed that a child who was given to thumb-sucking should not be spoken to about it. There was another method which she had recently adopted in one or two rather stubborn cases and which had proved successful. She had pretended that there was something the matter with the child's hand or arm, and under the pretence of curing that, had put on an apparatus which would prevent thumb-sucking.

Mr. Wilson Charles said that one form of psychological treatment for thumb-sucking which had been found very efficacious was for one of the child's parents or someone else to suggest to the child when it was going to sleep that it should stop sucking its thumb.

Mr. H. G. Watkin said that a method of curing thumb-sucking which was sometimes successful was to get a pair of kid gloves which fitted the child well and to stitch the thumbs to the first and second fingers, or to three fingers. The child would not suck its thumb and two or three fingers as well. A screen was also useful in cases of thumb-sucking. With regard to lack of spacing in the deciduous dentition, he thought that in most of the cases Mr. Apperly had shown, if they were left a little longer, the space would widen out in front. He did not quite agree with the extraction of the C's.

Mr. Norman Gray said he had a daughter aged three who was a very persistent fourth finger sucker. It was extremely difficult to put a plate in her mouth, and he had tried suggestion until he had almost produced nightmares ; in fact, she had sometimes awakened in the night after dreaming that her finger had come off, and things like that. The extraordinary force with which she could suck amazed him ; he went into her bedroom about seven o'clock every evening and pulled her hand out of her mouth, and it came out with a report like a cork being drawn. The child's nurse had made some Dorothy bags, which could be closed by means of strings at the end being pulled, and these were put over the child's pyjama jacket and tied or even stitched. The child did not like sucking these canvas bags and when she had them on she did not try to suck her finger, but if they were left off the habit returned. She had now started a lip habit because of the protrusion of the front teeth. It was encouraging to notice in other child patients that it did not always promise a similar malocclusion of the permanent dentition.

Mr. P. G. Capon said one frequently heard of the effect of bad habits, such as thumb-sucking, in creating malformation, but no paper had yet been read on the absence of effect in some cases of children who had such habits. He mentioned that because he himself had been a

thumb-sucker and for years always went to sleep with his thumb in his mouth, but he did not think it had resulted in any abnormality in his case, and he had never received any orthodontic treatment. Because all children practising bad oral habits did not show evidence of serious abnormalities, he wondered whether the distortion of bone was just a symptom of faulty bone structure and if with sound calcification the effects would be very slight.

Mr. K. Hooper said he had three children. The eldest one, a large and lusty boy, sucked his thumb so persistently that he had a real corn on his thumb. He had tried all kinds of contrivances to prevent the thumb-sucking, including the bag referred to by Mr. Norman Gray, but the child would sit up in bed patiently for about three-quarters of an hour, until with his teeth he had unfastened the knots, and then, having removed the bag, he would subside into sleep with his thumb firmly in place again. The child had, however, a normal arch and very good teeth in perfect alignment. Personally he agreed with the suggestion made by Mr. Capon ; he was sure that, if a child had normal healthy bone-formation, gross thumb-sucking would do little or no harm, but in cases where there was defective bone-formation a very moderate amount of thumb-sucking would have a serious effect. In his second child thumb-sucking had been stopped in the earliest stage of infancy by his hands being tied down, but that child had much more prominent upper incisors than his brother, owing to the fact that his nasal passages had not been nearly so satisfactory as his brother's. Therefore he was sure that thumb-sucking alone was not a gross trouble.

Mr. G. C. Friend said he had two children. The elder was three-and-a-half ; he had two warts on his thumb, having been a persistent thumb-sucker, but he was now giving up the habit gradually and only sucked his thumb when he woke up early in the morning and there was no one to play with him. His occlusion appeared to be perfect and he had a normal healthy mouth. The usual methods had been tried to prevent the thumb-sucking, but had been given up in disgust, and personally he was not sure whether it was right to stop young children thumb-sucking ; certainly the psychologists did not agree that it was right to do so.

Mr. L. Russell Marsh said his opinion about thumb-sucking was that as long as the child was at suckling age it was quite safe to allow it to suck its thumb, but when it began to take its food from a spoon an effort should be made to stop the thumb-sucking gradually. A thought which had just occurred to him was that possibly the habit of thumb-sucking, in a child with very healthy bone, might ensure clearance and normal function of the nasal passage.

Mr. Maxwell Stephens said that sometimes a small wire cage put over the child's thumb and worn at night would prevent thumb-sucking. In speaking rather hopelessly about the expansion of the jaw, Mr. Apperly did not allude to the antero-posterior axis of the arch needing expansion. Some of the arches he had shown were quite well developed across the palate, but required expansion in the median axis, and if this did not always prove possible, some of these would be found to develop as cases of Angle's Class II, division 2, later. With regard to the Class III case which Mr. Apperly had demonstrated, if he had shown the lateral views of the occlusion, evidence might perhaps have been furnished which would have justified criticism of his classification. Speaking of such cases, in which the upper incisors fell behind the lower, Mr. Morris had described a method, some years ago, of bringing forward the upper incisors satisfactorily after the antero-posterior axis had been extended. He thought that even though the measurement of the arch was lengthened, and one managed to get

the upper incisors beyond the lowers, it was advisable to watch them very carefully, as there was a tendency for them to relapse in adolescence.

Mr. H. C. Apperly, in replying to the discussion, said he was very grateful for the information that had been given to him about methods of preventing thumb-sucking, and he would certainly bear them in mind. With reference to Mr. Watkin's statement that he would not have extracted the C's in the case he had shown, in that particular case there really was not enough room, however much one expanded, to get the incisors in without spoiling the whole facial appearance. There was a very short lip. He intended to take out the upper 4's later. A full complement of teeth was not required in the case in question.

Failures in Orthodontic Practice*

By Harold Chapman, L.D.S.
and L. Russell Marsh, L.D.S.

Messrs. Chapman and Marsh opened a discussion on the above subject. Mr. Chapman's remarks are given first and are followed by Mr. Marsh's.

Mr. Harold Chapman said he did not intend to show a series of failures, but to speak of one particular type of failure of treatment, i.e. enlargement of the arch (he preferred the word enlargement to expansion because what he envisaged involved increase of length of the arch as well as breadth), and to show some cases to illustrate his argument. He held, as a general principle, that it was not possible to enlarge arches with appliances to a greater extent than they would enlarge naturally without treatment. He did not mean that he did not widen arches at all ; he did, because he believed it to be the correct treatment in certain cases (and he hoped to deal with this question in a future paper[4], but he was extremely doubtful of its efficacy in Class I cases (small arches and a small masticatory face (Figs. 1 and 2)). He was aware that that opinion was not held by everyone. After one of the previous meetings at which he had spoken on the subject, he had been told that he had to prove his contention. That was a very natural thing for anyone to say who supported the theory which had held the field for the last forty years, but he thought it was for those who supported that theory to prove that it was well founded (if the theory is valid this should not be difficult), rather than for him to prove his contention. However it seemed to him that the suggestion (that he must prove his contention) was really an admission that his idea had a good foundation.

Angle taught that every case of malocclusion should be made normal, a teaching which precluded the extraction of teeth. His classification was introduced about forty years ago ; personally he adhered very strongly to that classification ; he thought it was most valuable from the points of view of diagnosis and treatment, but it must be interpreted liberally, not rigidly : interpreted in the light of our present knowledge of normal occlusion and the changes it underwent from birth to adult age, and in the light of changes of position of teeth due to local causes.

* Read before the Society, 1937.

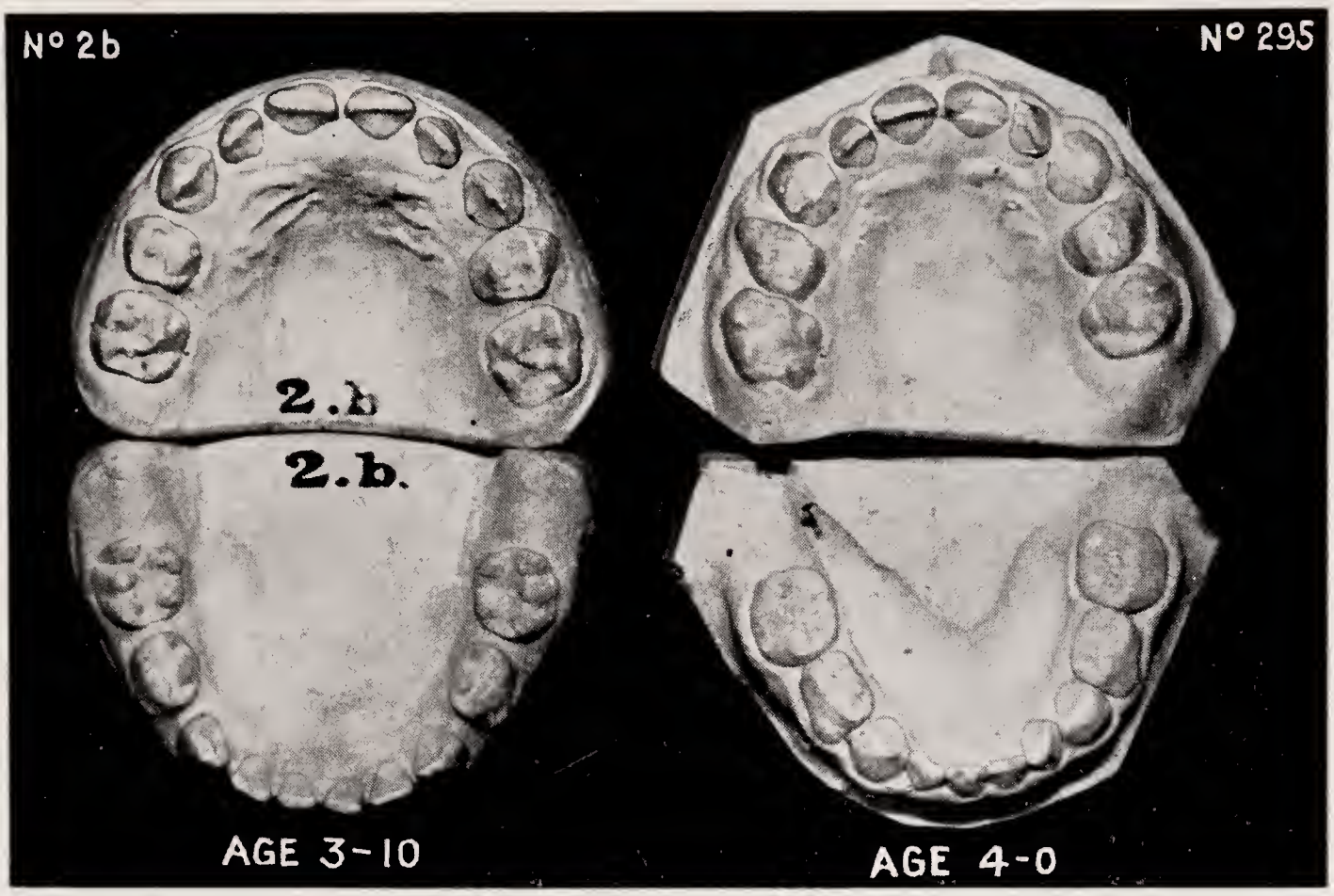


Fig. 1. On the left, normal; on the right, Class I.

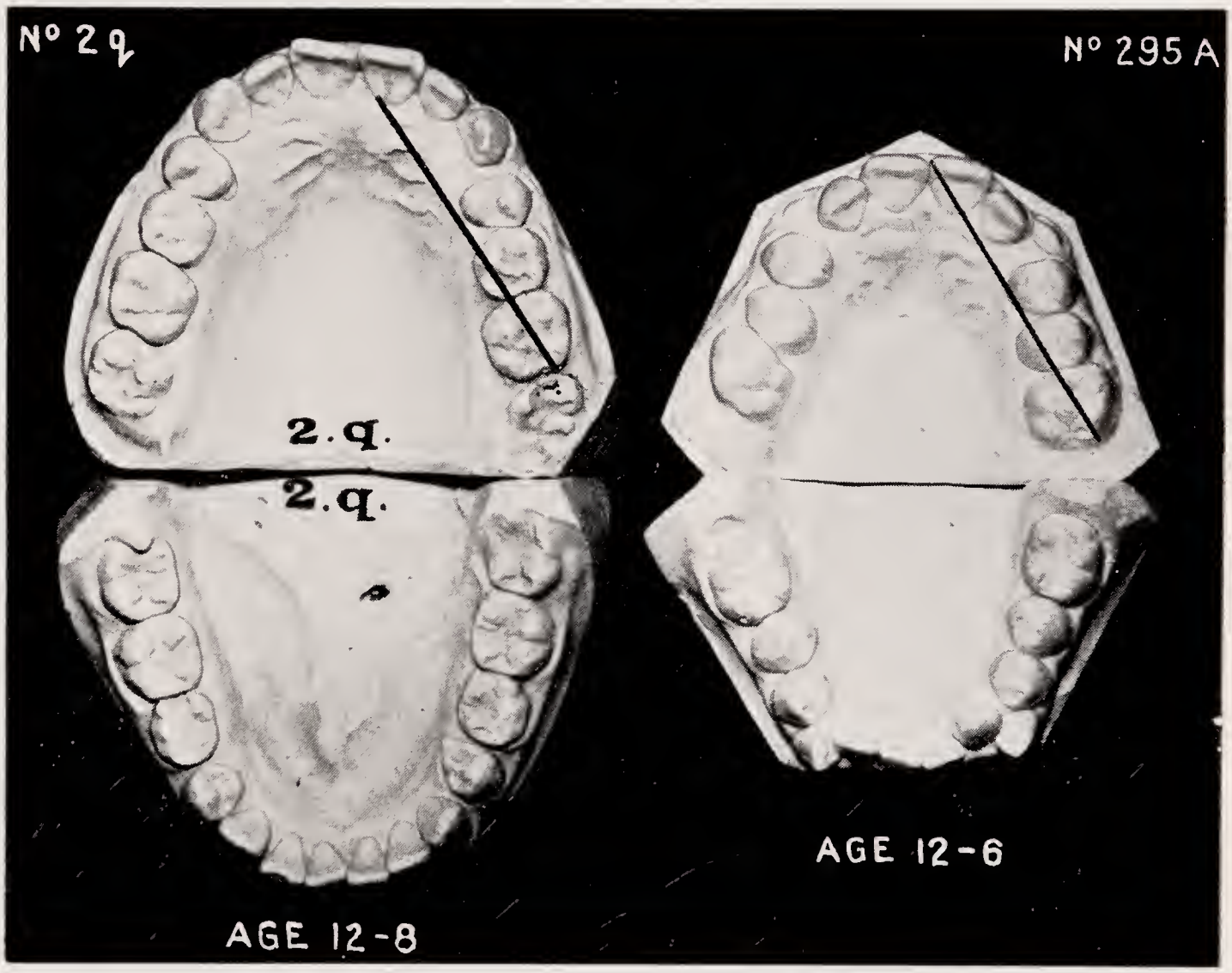


Fig. 2. Same cases as Fig. 1, no treatment. On the left, normal; on the right Class I.

He believed, however, that the Angle classification needed supplementing, as a result of clinical experience, to be of the greatest value to orthodontists.

In the past he had considered the Angle classification to be a classification of antero-posterior arch relationship, that is to say the arches were in their right relationship or the lower was too far back or too far forward, but he now realised that it was a classification into which the size of the arch entered, so that there two factors were involved :—

(i) The relation of the lower arch to the upper arch antero-posteriorly, and

(ii) The size of arches.

From the point of view of treatment, those two factors were entirely different. If one wanted to convert the arch on the right of Figs. 1 and 2 into those on the left of Figs. 1 and 2, one had to increase the size of the masticatory face, which is all that area below the glabella and in front of the external auditory meatus, and he could not imagine that by just moving teeth that could be achieved. He felt that one had to enlarge the structures beyond the teeth ; that was to say, the masticatory face, as defined above, had to be enlarged if the treatment (which includes keeping all the teeth) of such cases as is shown on the left of Figs. 1 and 2 is to be successful. That was a very big thing to do, and it seemed to him incomprehensible that an orthodontic appliance could bring about that change.

The question of arch relationship and the possibility of changing it appeared to him to be an entirely different problem. He was convinced that where there was a prenormal relation of the lower to the upper, it was one of the easiest operations in orthodontics to bring the lower arch into its right relationship with the upper arch, and it would remain in position. It could be done in a short time ; often the operation, retention included, was finished in a year or even less, whereas he did not know when the other operation, arch enlargement, which would be permanent, would be finished. If it was easy to move the mandible back, why should not it be just as easy to move it forward ? It was as easy, but, owing to the mechanical arrangement of the teeth, it did not stay forward so well as it stayed back. In his experience, however, it did stay forward if it was retained long enough. To him the two operations arch enlargement and change of position of the lower arch in relation to the upper one, were entirely different and must be regarded as two entirely different problems ; arch enlargement denoted increase of bone ; change of arch relation denoted change of shape of bone : it is essential that orthodontists appreciate the difference between the two operations.

On his classification Angle built a superstructure, namely, the theory of non-extraction. From what he had already said, it would be realised that he believed that that theory was untenable as regards the size of the arch, but it was tenable as regards the relationship of the lower arch to the upper one ; he thought that relationship could be changed permanently.

It was very interesting to consider why the theory of non-extrac-

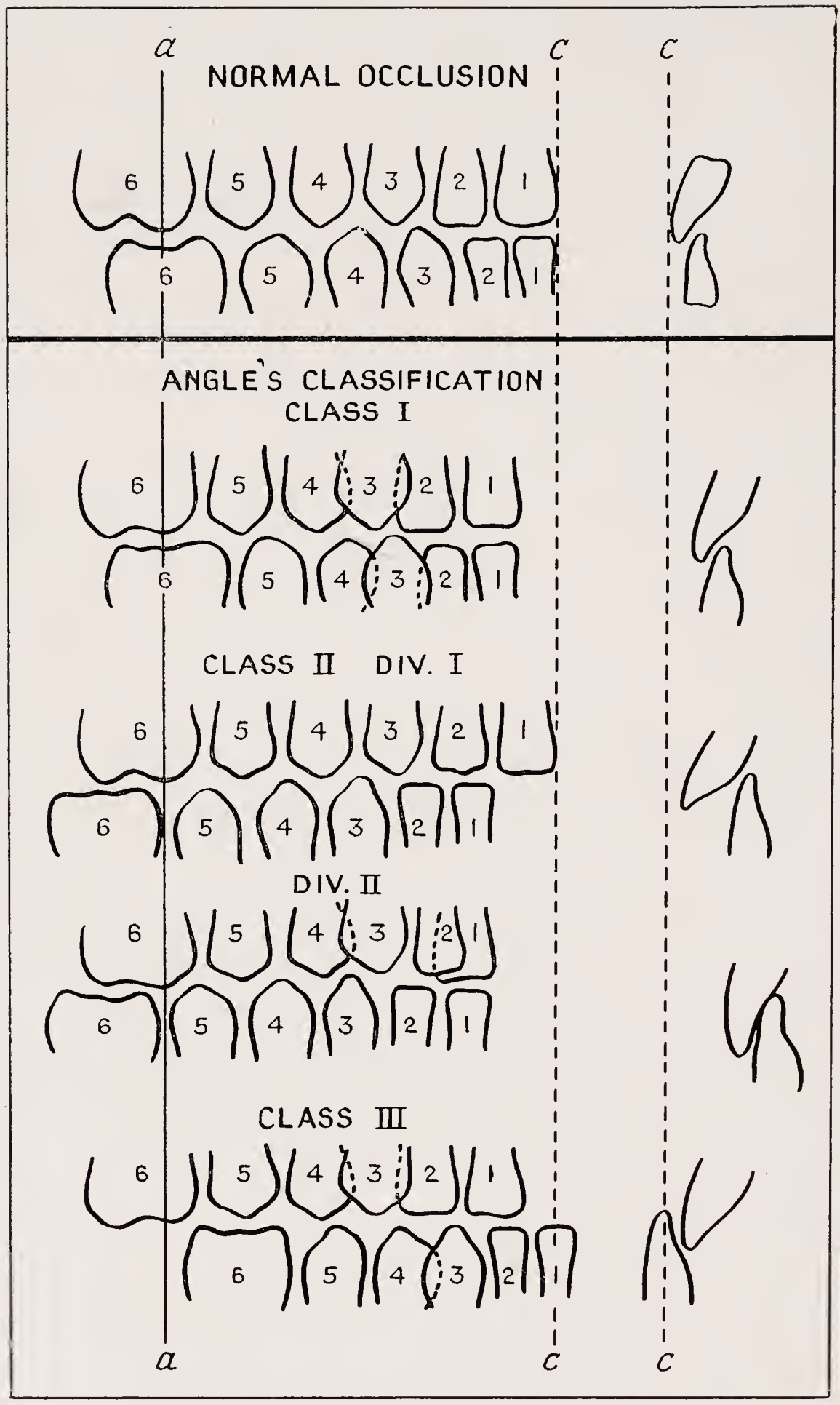
tion had held the field so long, supposing it was not substantiated. It was perhaps surprising that it had not been challenged openly, but if one read between the lines in the literature, one found that it was challenged. What are the reasons why the theory was so generally accepted? In the first place it was very attractive; it *is* attractive to make a thing perfect, to treat cases such as those shown by Mr. Apperly that evening, to treat cases of irregular incisors and so on, and to make them perfect, which included retaining all the teeth. Again, the theory had the appearance of truth. In almost every instance teeth could be moved so that they were in what might be called perfect occlusion. The theory had also had a wonderful propaganda. Those who had been to Angle's school knew that he had an outstanding personality and that it was his object to impress his ideas on his students absolutely.

Again, it sometimes appeared as if the theory were true with regard to the size of the arches, because some cases improved without any treatment; in reality they were normal cases but we were not familiar with all the appearances of normal, therefore if they were treated they would, of course, improve, and that would lend support to the theory. In the cases which were not successful the lack of success would be ascribed to some failure in technique or other cause, but not to the tenability of the theory.

The question of diagnosis was a very important one; it was really the crux of the matter. In diagnosis he included not only classification, but also realisation of the bone error, e.g. insufficiency of bone and position and/or shape of bone.

Fig. 2 shows, on the right hand side, a Class I case, 12 years of age. There was insufficient space for the canines. He had no doubt that the dental arches could be enlarged and the teeth put in alignment and in perfect occlusion, but he was convinced that the teeth would relapse, when retention was discarded, even if they had been retained for five years. Fig. 1 shows the same case at 4 years of age, when all the teeth were in contact: at this early age the case can be diagnosed as having very small arches, but in his opinion it could not be treated successfully at that or any age by retaining all the teeth.

Fig. 3 shows the Angle classification with normal occlusion above it. It would be noticed that the arches in Class I are in correct relation, but smaller than normal, whereas in Classes II and III they are normal in size (except for correlated abnormal formation—Norman Bennett), but not normal in relation: clinically, it is known that they may also be smaller than normal.



(Bennett, Norman G.: "The Science and Practice of Dental Surgery," 2nd ed., Vol. I, p. 437, Fig. 447B.)

Fig. 3. Diagram of normal occlusion and the Angle classification.

Supplementary Classification		
ARCH RELATION	ARCH SIZE	
	NORMAL	SMALL
NORMAL	*NORMAL OCCLUSION*	Class I
POST-NORMAL	Class II	Class II
PRE-NORMAL	Class III	Class III
TREATMENT (If all teeth kept)	PROGNOSIS	
	Good	Not good

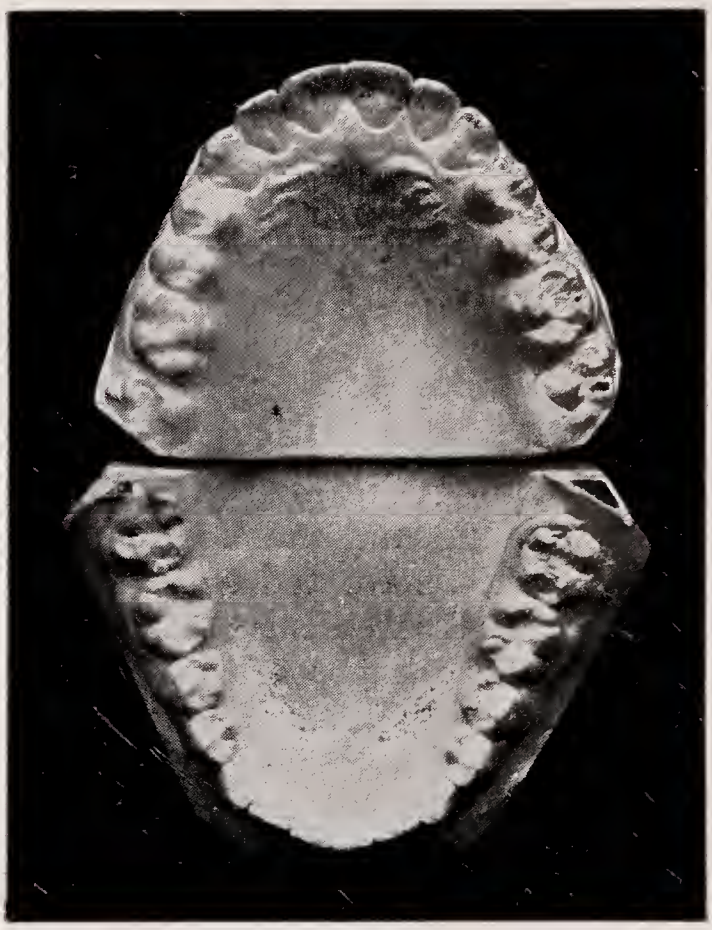
Fig. 4.

He therefore proposed to supplement Fig. 3 by making two columns, one for arches normal in size, and one for arches which are too small (Fig. 4). The cases which fall in the first column have a normal masticatory face as regards the amount of bone, and can be treated without extraction ; those in the second may also be treated successfully as regards arch relation but require extraction (in practice frequently of an upper tooth or teeth only) to obtain good alignment of the upper teeth.

He said above that diagnosis is important—it is important because if diagnosis is incorrect treatment is likely to be incorrect. Fig. 5 shows a case at ages 6, 8, and 12 years—it has not been treated. If one diagnosed this as a case of small arches it fell in the second column of Fig. 4, but if one diagnosed it as a case with normal arches it fell in the first column and at the top of it. Therefore our knowledge of what is normal is of the very first importance,

Age 6–8.

Age 8–4.



Age 12–0.

(*Chapman, Harold: Transactions British Society for the Study of Orthodontics,* 1930.)

Fig. 5. Serial models of a case of normal occlusion: no treatment. Notice the gradual improvement of the alignment of the lower incisors.

and in this connection he commended to their consideration the first half page of a paper by Dr. Worth[9] on radiological diagnosis, and asked them to read it as if it applied to orthodontics. If diagnosis is not correct the statistics relating to the percentage of normal occlusion at various ages is incorrect, and he believed this accounted for several writers saying there was a greater percentage of malocclusion in cases of mixed dentures, than in dentures in which there were only deciduous or only permanent teeth.

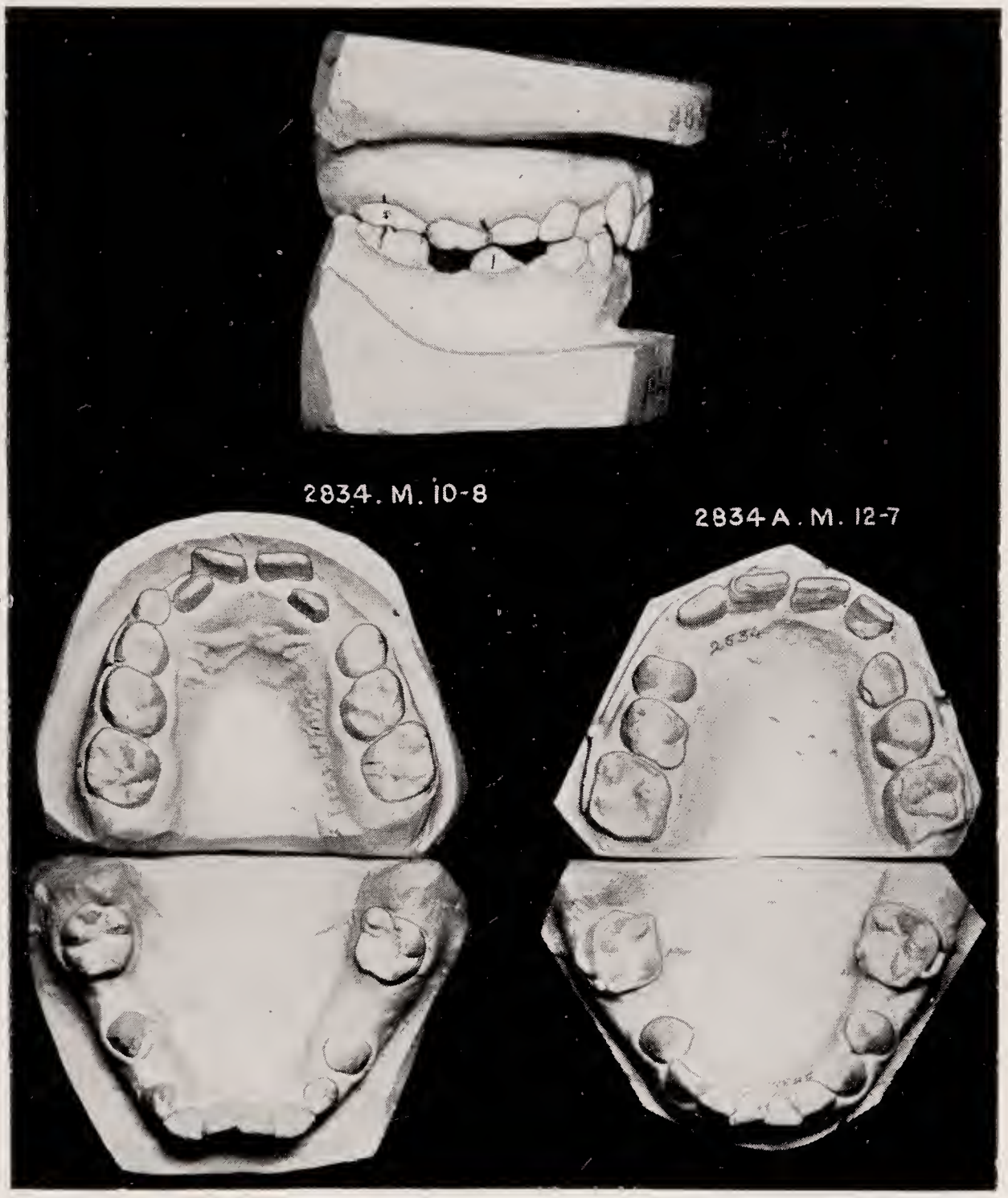
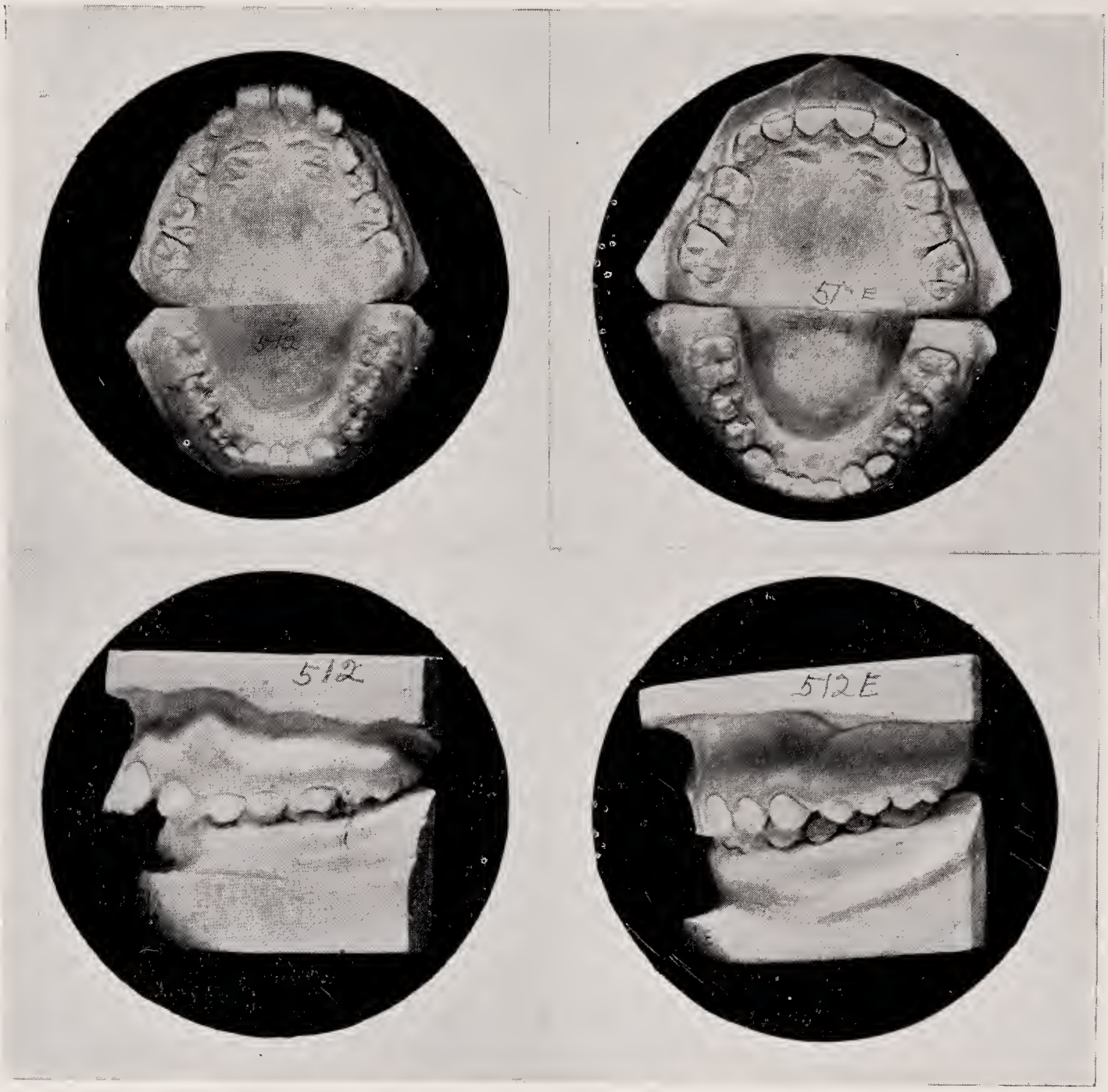


Fig. 6. Normal occlusion at age 10–8, except $\underline{2 \mid 2}$ are in lingual occlusion to the lower teeth.

Fig. 6 shows a good lower arch. There is ample space for the premolars. The bucco-lingual relations of the teeth (except the upper laterals) is correct, as is the arch relationship : therefore if the lower arch is good, the upper must be equally good, but it

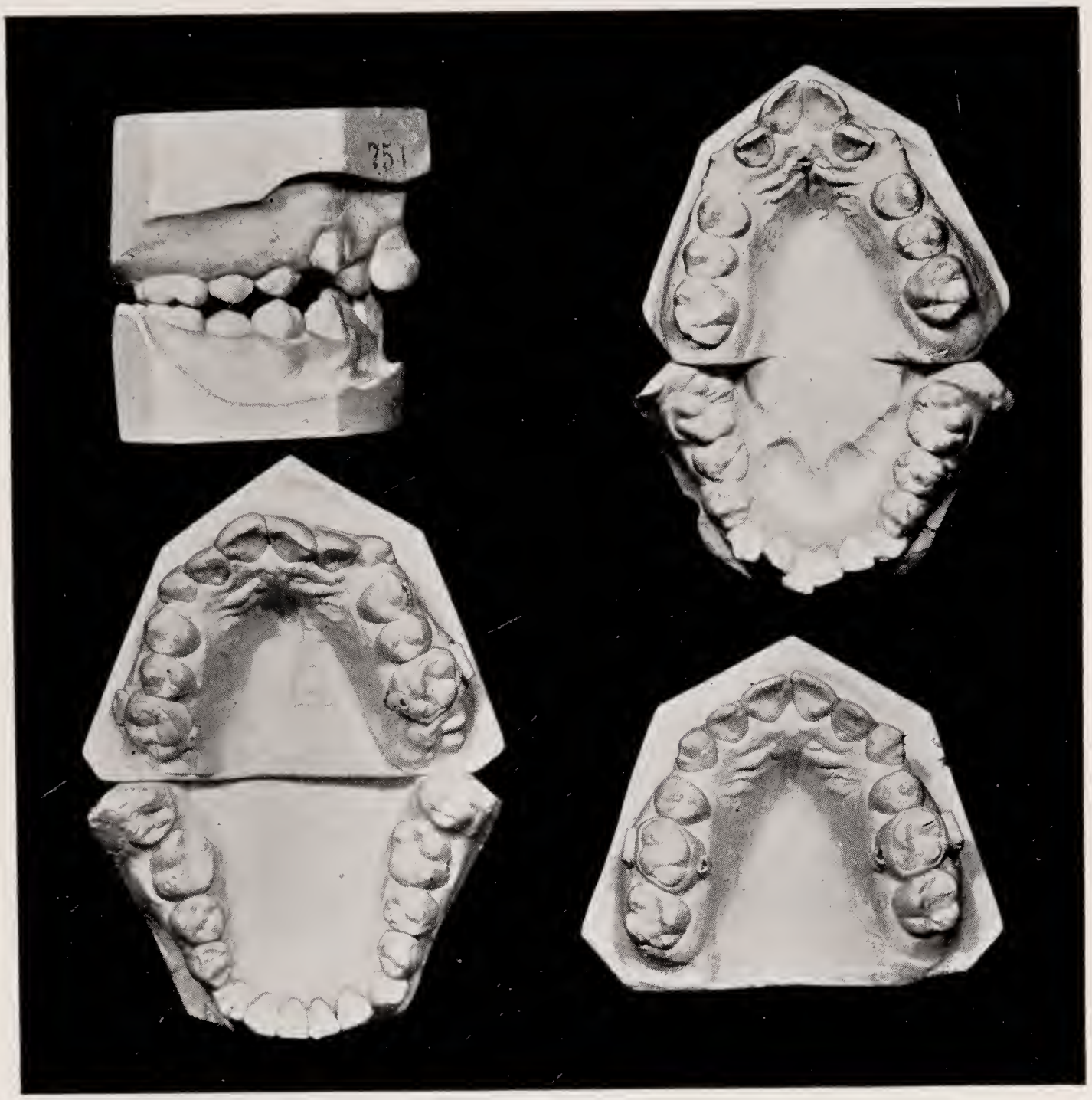
looked very bad, because the laterals were in lingual occlusion. He would diagnose the case as being normal except that the two upper laterals need to be moved labially. When the child was seen first he was wearing an upper labial arch and a lower lingual arch. The upper labial arch seems to have had a cramping effect on the lower incisor teeth : the space across the laterals has been considerably reduced, and it is doubtful if there is now enough room for the premolars. If the case had been left alone, except for moving the upper laterals over the lower anterior teeth it would have developed normally : it is an example of the necessity for an accurate diagnosis to avoid unnecessary treatment. In this case an incorrect diagnosis has resulted in some treatment which was not only unnecessary but was disadvantageous.



(*Chapman, Harold : Transactions 1st International Orthodontic Congress,* 1926)

Fig. 7. A Class II, division 1 case with a good lower arch indicating a normal, or almost normal, masticatory face.

Fig. 7 shows a postnormal case, with good arches, before and after treatment. A good result is obtained in such a case if one brings the lower arch forward, and that can be done with the right treatment.



(Chapman, Harold : Transactions British Society for the Study of Orthodontics, 1928.)

Fig. 8. A Class II, division 1 case with small arches (as indicated by the crowding), and therefore a small masticatory face. This case has the same error as a Class I case, but in addition postnormal relation of the lower to the upper arch.

Fig. 8 shows a postnormal case with small arches. He did not believe it was possible to get all the teeth into line and to retain them there. As far as he knew, the removal of the two first upper premolars had produced a satisfactory result, after an unsuccessful attempt to treat the case by keeping all the teeth.

He thought it must have been ten, twelve, or more years ago that he first began to suspect that the expansion theory did not hold good. He wondered then if failure was due to treatment being undertaken too late, and so he advised earlier treatment.

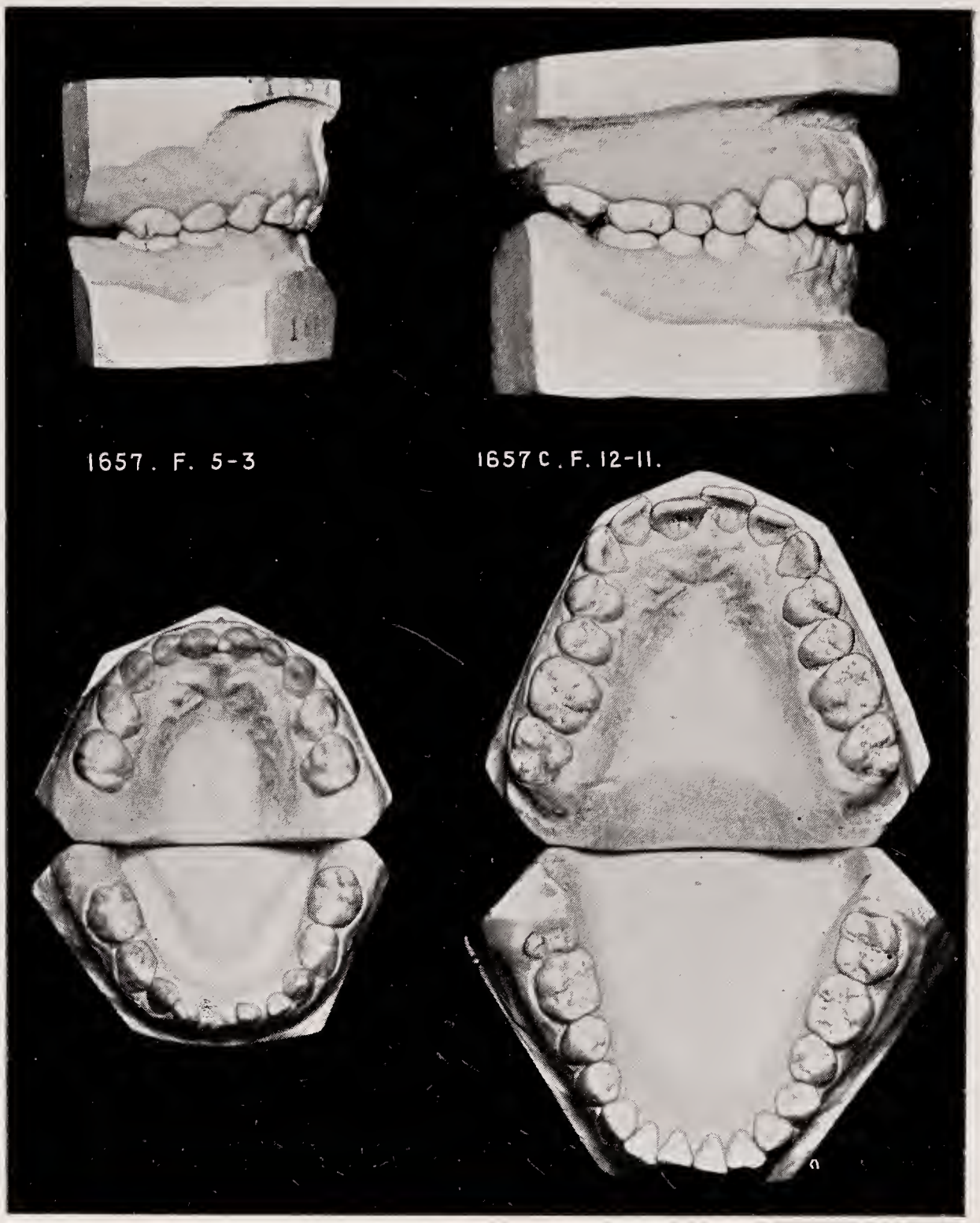


Fig. 9. A Class II, division 2 case with small arches and therefore a small masticatory face. Treatment by keeping all the teeth has not resulted in the upper incisors remaining in good alignment.

Fig. 9 shows a case of postnormal occlusion (Class II, div. 2); the arches are too small, all the teeth being in contact; the treatment was begun when the child was between 5 and 6 years of age. A good result was obtained, but as the illustration showed, at 13 years of age there was relapse and sufficiently bad imbrication of the upper incisors to necessitate further treatment. The child was re-treated by a colleague, but he believed the second treatment was not more successful than the first, and then a tooth was removed. Personally he did not believe in re-treating cases on the same lines if the first treatment had been correctly carried out.

What had the foregoing experiences to do with failures? They had led him to the conclusion that if the masticatory face is small all the teeth could not be retained in good alignment—the number of teeth, i.e. the amount of dental tissue must be made to conform to the size of the masticatory face as the latter could not be made to conform to all the teeth in alignment. Fig. 4 indicates when extraction is and is not indicated, and he believed that if treatment is based on the lines advocated in Figs. 4 and 10 many failures in orthodontic practice will be avoided, but it must be realised how essential is accurate diagnosis, and how important it is for the operator to have clearly in his mind both the result he wishes to establish, and the way in which it can be brought about. The criteria for the result are indicated in Fig. 11.

The first column of Fig. 4 includes only those cases in which the masticatory face and dental arches, as regards size, are normal: if the arch relationship is correct the case is normal; treatment is not required: but the arch relation may be incorrect though the arches are the correct size: prognosis as regards the correction of arch relation is good, and so this is advised.

In Class II, div. 1, the lower arch must be brought forward with intermaxillary traction, a form of treatment to which children adapt themselves without difficulty; the wearing of plates is not only more irksome but almost invariably ineffectual as regards bringing the mandible forward.

In Class II, div. 2, the treatment may be as for div. 1, but there are alternative treatments.

In Class III the lower arch is moved distally.

The second column of Fig. 4 includes those cases in which the masticatory face is small, and, therefore, extraction is necessary.

In Class I extraction (maybe of upper teeth only) suffices unless it is necessary to align the upper incisors: rotation, proclination, and imbrication of these is best carried out before calcification of the apices.

In Classes II and III the arches may also be small as in Class I, and then extraction must be combined with correction of the position of the mandible. The question of extraction he had dealt with on other occasions, but whether the extraction is part of the treatment or not, the size of the upper arch must be correlated to that of the lower arch in its new position, and in his experience that was good and satisfactory treatment.

Fig. 10 indicates the treatment that is likely to be successful for the different irregularities mentioned.

In every case it was necessary to look at the whole denture, both the upper and lower arches, and to regard what effect treatment in or of one arch would have on the other; e.g. the removal of one misplaced lower tooth may have disastrous repercussions in the upper arch. Again he emphasised the importance of accurate diagnosis.

It was necessary to know whether a case was normal in all its phases; with our present lack of knowledge this was what he felt presented difficulties which time and experience would overcome.

1	IRREGULARITY	TREATMENT	PROGNOSIS
	Small Arches Classes I II or III	Extraction (often upper teeth only)	Good
2 *a*	Post-normality Class II Div. I	Bring mandible (*a*) forward (*b*) backward with intermaxillary traction continued three years in the case of (*a*)	Good
2 *b*	Pre-normality Class III		Good
3 *a*	Rotation of upper incisors	Correct the alignment as early as possible and before calcification of the apices Teeth must have sufficient space Retain two years	Good
3 *b*	Mal-alignment of upper incisors	Correct the alignment as early as possible Perfect retention difficult	Uncertain
3 *c*	Proclination of upper incisors	As for 3 *a*	Perhaps not as good as for 3 *a*

These irregularities may occur in any combination

Fig. 10. Treatment for various types of malocclusion.

Every case a problem of entire denture
and demands a knowledge of

NORMAL
DIAGNOSIS
TREATMENT
PROGNOSIS
} In all its phases: Then is possible and is followed by must be considered together to give a

RESULT
which is or has

PERMANENT
- AESTHETIC
  - Correct alignment without proclination of $\frac{2\,1\,|\,1\,2}{}$
  - Good occlusal relation of $\frac{2\,1\,|\,1\,2}{2\,1\,|\,1\,2}$
- FUNCTIONAL — Good occlusion of (Incisors, Molars)

Fig. 11. The orthodontic problem.

Treatment must always be considered with prognosis, and Fig. 11 indicates the result which should be striven for.

At the annual meeting of the British Dental Association at Cambridge, Professor Ryle read a paper on "Experiment and Experience,"[5] and he had been thinking about that in regard to orthodontic problems. It seemed to him that experience was the best teacher orthodontists could have, but he was inclined to think that some of it was, if one might be allowed to combine Professor Ryle's two words, experimental experience, and that was one thing which he wanted to eliminate as much as possible. It seemed unnecessary for every practitioner to gain the same experimental experience—how much better progress would be made if one began where one's predecessor left off. The sentence in Professor Ryle's paper that had struck him most of all was this: "Much pertinent observation in practice goes to waste." That was what orthodontists were allowing to happen. There were many observations which they could make, and if they only collected the evidence they could learn a great deal. They should make observations of normal and abnormal cases, without treatment, by means of serial models, and also of the results of treatment. He could not imagine at the moment any more important research work for the orthodontist to undertake. Who was going to do it? Who could do it better than the members of this society?

[This paper should be read in conjunction with the first four papers referred to in the bibliography..]

The blocks for Figs. 1, 2, and 5, have been kindly lent by the British Dental Association. The illustrations appeared in the *British Dental Journal*, 1st March, 1935.

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Mr. L. Russell Marsh said that the title of the discussion might have caused surprise amongst the members and therefore called for some explanation. It had been suggested by a member who evidently considered that, as most of the time at these meetings was occupied in discussing questions about which the members knew so much that it was a mere formality to attend the meetings at all (!), it might be of some interest to promote the discussion of a subject about which none of the members knew anything whatever. Most people had seen a child's school report and had noted with pleasure the remarks "Excellent," "Very Good," "Good" and "Very Fair" against the various subjects. It was not until one had seen many school reports that it dawned upon one that there was nothing worse than "Very Fair." He suggested that the members had met this evening to discuss their "very fair" successes. One definition of the word "failure" was "anything done imperfectly or attempted unsuccessfully." If we understood the word "perfection," this definition would seem to embrace almost all orthodontic cases ever attempted.

It was true that in orthodontic work complete failures were probably as rare as complete successes; that was to say, given reasonable co-operation, it was almost as difficult to get no result whatever as it was to attain perfection. It might be helpful if he enumerated some of the causes which might lead to disastrous or disappointing results. They fell under two headings: (1) Those causes which were beyond the control of the operator, and (2) those causes with which the operator was concerned.

The first group included :—

(1) *Lack of co-operation on the part of the patient or parent.*—Such co-operation should be insisted upon as a condition of treatment. Unfortunately the lack of it was often not apparent until treatment was well under way, when the orthodontist was faced with complete relapse if he carried out his threat of suspending treatment. Mutual understanding on the part of the whole profession would go a long way towards overcoming this difficulty, which constituted a very good reason why orthodontists should hesitate to criticise the work of their colleagues.

(2) *Unexpected difficulties arising during the course of treatment.*—Illness or any other circumstance might necessitate temporary or permanent cessation of treatment, leading to partial or complete relapse.

Accidents causing damage to anterior teeth.

The school problem.

(3) *Psychological factors.*—In cases of very nervous or wilful children it was sometimes wiser to postpone treatment until a later age, even though the case might deteriorate meantime.

(4) *Obstinate Habits.*—Which might prove to be irremediable.

(5) *Mutilated Cases.*—Due to caries, missing or previously extracted teeth, early removal of deciduous teeth, dilaceration, cleft palate and so on.

The second group included :—

(1) *Wrong diagnosis and wrong treatment.*—Under this heading it was necessary to stress the importance of appreciating the potentialities of bone growth, of visualising the ultimate result with due

regard to the harmony of the face as well as occlusion, and of treating each case individually rather than according to classification.

The question of the removal of teeth was sufficiently involved to occupy an evening's discussion. There were cases in which the removal of teeth undoubtedly resulted in failure, and others where an obstinate refusal to extract might be equally disastrous.

(2) *Failure to remove the cause.*—In such cases where the cause could not be removed, some modification of ideal treatment might be necessary. While some causes, such as heredity, environment, abnormally large tongue, cleft palate, etc., were beyond the control of the operator, and others, such as habits of speech, breathing and mastication, might be very difficult to correct, there were local causes which were often overlooked, and in this connection might be mentioned those cases in which close-bite was the direct result of postnormal occlusion, both of which could be corrected by intermaxillary traction.

(3) *Failure to consider psychological factors in deciding upon the line of treatment to be adopted.*

(4) *Lack of final equilibrium.*—Due to a condition of tension on completion of the case, or later to pressure from the third molars, over-expansion, interference with surrounding muscles, reversion to bad habits of speech and expression, etc. Unless equilibrium was established the case would relapse.

The speaker quoted a case in which twelve months' treatment had produced practically no result owing to "passive resistance" on the part of the patient. The child, though unresponsive, was quite good in the chair, but removable appliances were never worn, and fixed appliances met with an astonishing sequence of unfortunate mishaps.

In another similar case he had had eventually to resort to extractions. The parents were delighted with a result which, though of reasonably good appearance, gave him little pleasure. He felt that the orthodontist often found himself in a delicate position. It was inadvisable to report to the parents, thereby sacrificing the friendship and co-operation of the patient altogether, unless absolutely necessary. On the other hand, the orthodontist had to bear the responsibility for any setback in the treatment. In extreme cases the parents should be told quite frankly that it is useless to continue treatment, unless possibly the attitude of the child should alter later on.

A Class I case had resulted in the lateral incisors slightly overlapping the centrals. They were very large laterals—almost the size of normal central incisors—and towards the conclusion of treatment it became obvious that to provide sufficient space would result in a prognathus appearance. The alternative seemed to be the removal of two upper premolars. After a second opinion to this effect the parents were satisfied to leave the case as it was. He had based his prognosis of this case upon a belief that the length of the lower arch of teeth is constant in its proportion to the length of the upper arch. There were evidently exceptions to this rule.

He had recently seen a middle-aged patient who had been a true prenormal case successfully treated. The case had relapsed completely after the removal of some of the posterior teeth.

Discussion

Mr. H. G. Watkin said he thought one point which should be borne in mind was the size of the tongue, which had a great deal to do with the size of the arch. If the outward pressure of the tongue were small there were small arches. He had recently treated an actress whose upper teeth were protruding, and it was most important that she should have a good appearance. He told her mother that it was impossible to get the teeth to stay back unless the size of the tongue were reduced, as it was much too large. Therefore, in co-operation with the local surgeon (Mr. G. C. E. Simpson) in Liverpool, he took a large slice out of the front of the tongue, and a great improvement had been made in the patient's appearance. With regard to the patient's co-operation, he thought that was a most important point. He would not start treating a case unless the patient promised to co-operate. As an example of co-operation on the part of the patient he would mention the case of a girl of 16 whose parents brought her to him. She was absolutely "fed up" with orthodontics, having had all sorts of appliances in her mouth for about five years. The lower incisors were imbricated and the upper incisors were still outside the lower lip. She had a complete dentition. He told the parents that he could not do anything in the case without extraction; they agreed that he should extract some teeth, and he took out the 5's, not being brave enough then to take out the 4's. The result was very satisfactory. At first the patient was sulky and did not take an interest in her teeth, but after about six months' treatment subsequent to the extractions she was a brighter child altogether. She was quite pleased with the result of the treatment.

Miss Clinch said that there were three points about which she would like to ask Mr. Chapman. First, Mr. Chapman had said that good results could be obtained in a Class II case, but he did not agree that one could expand the upper arch. In a Class II case, if one brought forward the mandible so that the premolars and molars were in normal occlusion, one must get expansion of the upper arch somewhere, otherwise there would be lingual occlusion of the upper molars and premolars. If one took the original models of a Class II case, one could not get the upper and lower premolars and molars in correct occlusion. Secondly, Mr. Chapman had said that if the adult dentition were perfect the case must always have been normal, but surely there could be malocclusion at an early age due to a temporary lack of growth which corrected itself later. Thirdly, Mr. Chapman had said that the æsthetic result depended upon the alignment of the upper incisors and the occlusion of the upper and lower incisors, but she thought that the loss of premolars in many cases could give a very unsightly result in a certain type of face.

Mrs. M. P. Michaelis said she had been very much impressed by the attitude of the American orthodontist. She did not see how, particularly in Class I cases, they could possibly avoid failures if they did not extract.

Miss K. C. Smyth said she thought failures might be divided into those which were excusable and those which were inexcusable. As an example of an inexcusable failure she would mention a case that had been referred to her when the patient was 14 years of age; the case

had been treated for four years for protrusion of the front teeth. There was present in the dentition a supplemental incisor tooth, and the treatment which had been adopted was to retract all the incisors plus the supplemental incisor. This was an example of lack of observation. She thought that lack of knowledge was really the underlying cause of most orthodontic failures, and that was excusable only up to a point. She understood Mr. Chapman's main point to be that the expansion of cases was not justifiable, because only those cases succeeded which would have corrected themselves without any treatment. Nobody had been able to prove that, but it seemed that it should be capable of being tested, and she would like to see research undertaken into a number of cases of twins, each pair having some definite type of abnormality. One of the twins should be treated in the best manner known to the research worker and the other should be left alone to develop entirely untreated ; sets of models should be taken and the progress of the children recorded at regular intervals in a proper scientific manner. She thought such a research would yield very useful results. With regard to spacing, she would like to remind the members that Dr. Friel had recently raised the question of root spacing. There might be spacing of the roots showing growth of bone more towards the apical region, which did not show itself in actual spacing of the crowns of the teeth. Expansion of the deciduous arch did at least afford a temporary relief in the congestion of the space which was to be occupied by the permanent incisors. She thought all the members had seen cases in which there was not sufficient space for the permanent incisors between the deciduous canines, and if such cases were left as they were the permanent teeth would of necessity come down in irregular positions. The loss of even 2 mm. of space between the two deciduous canines was sufficient to cause a very great deal of irregularity in the permanent incisors. Unless one either expanded the deciduous arch or extracted the deciduous canines, there was bound to be that irregularity. If one made up one's mind to treat the case later on by extraction, this could not be carried out until two, three or four years later, and the bad irregularity of the incisor teeth would have to be left as it was, unless one adopted some form of expansion of deciduous teeth. She did not agree with Mr. Chapman that if a case became normal in the later stages it must have been normal all the time, because she thought that a case might be retarded in growth and development at a certain stage and then growth might take place with a rush and make up the past deficiency.

Mr. K. Pringle, referring to Mr. Chapman's statement that true prenormal occlusion could be easily cured, said it was very difficult to find such cases. Apparent prenormal cases were quite common, particularly in hospital practice, and were very easily treated. After the upper incisors had been pushed forward, the mandible fell back. Such cases were caused by the early loss of temporary molars. True prenormal cases were very uncommon. The number of cases that he himself had seen, in which all the teeth were in position, could be counted on one hand, and during the seven years that he had been a member of the Society no member, as far as he could recollect, had brought forward a case of true prenormal occlusion which he had treated, showing the models before and after treatment, except for one case of Mr. Chapman's which was, he thought, a true case and which Mr. Chapman treated very early.

Mr. P. G. Capon said it seemed to him that the general practitioner could supply Mr. Chapman with a great deal of information with regard to the serial models. He thought the general practitioner had golden opportunities of studying the seasonal development of the

mouth, when growth stopped for a period and then suddenly started again. It was a most spectacular thing to a dentist who was at all interested in the subject. He himself had been fortunate in being able to watch some of these cases, and in the little orthodontic work that he did he was beginning to leave a good deal more to nature than he had formerly done. He had been interested in Mr. Pringle's remarks, as he had intended to refer to a case which might be considered a failure. The child had a prenormal occlusion as far as he could judge, all the teeth being present at the age of $5\frac{1}{2}$ years. The mother was grossly prenormal. He corrected the child's prenormality very rapidly, a normal occlusion being arrived at five months later. The child was now postnormal. Would that case be considered a failure? An interesting point also was that the laterals were now overlapping the centrals and the canine was in the palate horizontally. It was his duty then, when the child was 12 years of age, to expose the canine, and he had now brought that into position. He felt sure that the case was a true prenormal one.

Mr. L. Russell Marsh said he had always felt that expansion could be performed successfully up to the point which nature intended it should reach; in other words, one could recover lost ground up to the point to which the child would have developed if everything had gone well, but if one attempted to expand beyond that there would be a relapse. When there had been a period of time during which development had been retarded, he did not see why one should not be successful in bringing it up to normal.

Mrs. L. Lindsay said that the question of expansion and the necessity of expanding in the region of the temporary canines, to which Miss Smyth had referred, had been brought forward in a paper by M. Bustin on twins. One child was treated and the other was not. The expansion in the two cases was the same, but the one which was treated would not have expanded without treatment, because the canines were caught and growth was definitely retarded in that region. Mr. Chapman had shown a model in which the first molars were erupting, and she believed he said that he expanded them. She thought they would have come into their right position without any treatment. Dr. Schwarz had discussed the subject in his wonderful study of the adjustment of the six year molar behind the temporary dentition, which she thought should be read by all those who wished to study occlusion. The genetists had brought forward a new factor in growth; previously there had been two factors, absorption and deposition of bone, but now there was a third which had been definitely proved, i.e., the ability of the bone to respond to stimulus. If that ability was not there, no amount of treatment would make the bone respond; it had to be inherent in the bone. She thought that answered many of the questions about the whole of the face responding to any stimulus that might be given to it either by exercise or by apparatus.

The President said he had been very glad to hear Mr. Chapman's indictment of the extent to which many orthodontists had practised expansion in years gone by. In his younger days he had been taught that expansion was the cure for practically all evils, but many years ago he had found out that that was not true. Many orthodontists over-expanded. He himself always taught, and had done so for many years, that if one expanded so that the outer cusps of the teeth, upper and lower, were slightly separated from one another there would be a relapse. So many of his own expansion cases had turned out to be failures that he was now very cautious indeed about expanding, but he was sure Mr. Chapman would agree with him when he said

that there were cases which could be expanded with excellent results.

Mr. H. CHAPMAN, in replying to the discussion, said he agreed with Miss Clinch that expansion of the upper arch in Class II cases was necessary ; he had no hesitation in expanding the upper arch in such cases if the lower arch was to be brought forward into correct relation with the upper. In the case shown in Fig. 7 it seemed to him that there was plenty of bone, and one also had the good lower arch, which was not likely to relapse as it had not been altered, to help in maintaining the expansion. He also expanded the upper arch in cases in which the upper teeth on one side were lingual to the lower and there was a good lower arch : he also expanded the arches (usually the upper) in certain other cases which he hoped to be allowed to enumerate on some other occasion. Another point which Miss Clinch had raised was the removal of premolars. He did not necessarily remove them. He had no hard and fast rule on the subject ; he tried to keep an open mind and do what he thought best in each individual case. He had shown one case in which he had removed a lateral. With regard to Mrs. Michaelis's remarks, he had received that morning by post from America a little booklet entitled : " The Purpose of Orthodontics." He had not had time to read it all, but he had noticed this sentence in it, taken from a paper by Dr. Kelsey in the *International Journal of Orthodontia* for 1937 : " I believe the time will come when orthodontists will be able to distinguish between those cases which are capable of being successfully treated along ideal lines and those which, through heredity or environmental conditions, do not offer the same possibilities." Reading between the lines, he thought that expressed much the same view as he had put forward that evening. He gathered that Miss Smyth did not think the case (Fig. 5) with imbricated lower incisors was normal. Personally he did not think there could be an intermediate stage in which a case could be abnormal ; he thought it must be considered normal throughout its orthodontic life if it were normal in the end, and he believed that would, in time, be the accepted view. A child might be broad in proportion to its length at one period of its life, but ultimately its proportions were normal. He believed that he could cure prenormal cases, provided they were not extreme. He was treating one at the moment, but it was a very extreme case, extreme as regards overbite but not as regards prenormality, and he was rather doubtful as to the amount of good he would be able to do. The case to which Mrs. Lindsay had referred in which the upper six year old molar was caught against the second deciduous molar, corrected itself without any treatment. What he had intended to convey was that the first time he saw that condition, a long time ago, he did treat it, but he did not believe now that it was necessary to do so.

The PRESIDENT conveyed the thanks of the Society to Mr. Apperly for his Short Communication, to Mr. Chapman and Mr. Russell Marsh for opening the discussion on " Failures in Orthodontic Practice " and to all those who had taken part in the discussions.

A Case of Unintentional Movement of the Tooth in an Adult*

By N. J. Ainsworth, M.C., M.R.C.S., L.R.C.P., L.D.S.

This is the case of a man of 53 years of age who had radium treatment for a growth on the tongue. He may have had an overdose, but at any rate he had radium necrosis of the mandible and was under treatment for that for about eighteen months, until about three or four months ago. At the end of that time he was seen by Mr. Kilner, who operated and removed a sequestrum consisting of the right side of the mandible, from the second premolar back to the angle. His occlusion is shown in Fig. 1.

After the operation the jaw swung over about half an inch to the right, and, in order to keep the occlusion central while the wound was healing, I was asked to make a splint of some kind (Fig. 2). I made the top splint, from the canine to the second molar, of cast silver. The bottom one extended from the right lateral to the second molar in the lower jaw. There were two hooks to take the elastic, and one or two more hooks were made in case it was decided ultimately to wire the jaws together, as I thought would be the case. It was considered desirable, however, to give the patient more movement of his jaws, because he was in a very shattered condition and dreaded the idea of having his jaws wired together. On trying to insert the lower splint, I found that I could not get it inside the patient's mouth. He had not a very good opening and he was highly nervous, and it was quite impossible to get the lower splint in without an anæsthetic. He dreaded the idea of having an anæsthetic again, so I cut the splint in half through the canine and cemented the incisor part. I adjusted the elastic, and soon afterwards the patient increased the traction by doubling the elastic. I had not anticipated that, but I saw no reason to object to it. This splint was very satisfactory; it gave the patient a good deal of moral as well as physical comfort, and he improved a great deal in his general health.

* Read before the Society, November, 1937.

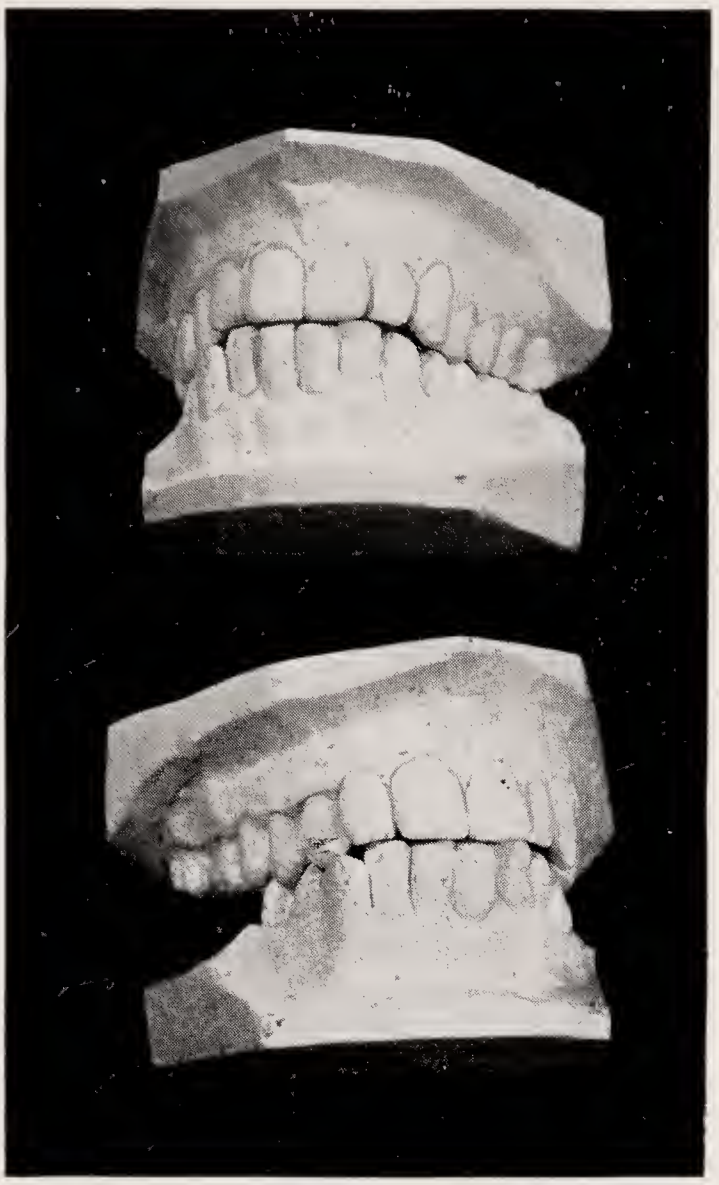

Figure 1.

Figure 2.

After five weeks I found the teeth to be moving. The lower right canine seemed to be becoming extruded a little, and the lower incisors seemed to be lengthening slightly. I considered that this movement was due to the patient having only the four incisors included in the splint, so I put on the other half of the splint and connected with it a bar, which terminated about 1 mm. below the hook on the incisor splint. I brought the elastic from the original hook on the upper splint to the end of the bar, so that the traction was in just the same direction. I also altered the double elastic to single elastic again. After a month it was apparent that the canine was continuing to move and that the left upper cheek teeth were being pulled over to the right. I therefore asked Mr. Kilner whether I might take the whole splint off, but he wanted it to stay on for a little longer, and I did not get permission to take it off until the end of another month. I then took another photograph (Fig. 3). Figs. 4 and 5 show the present occlusion.

Figure 3.

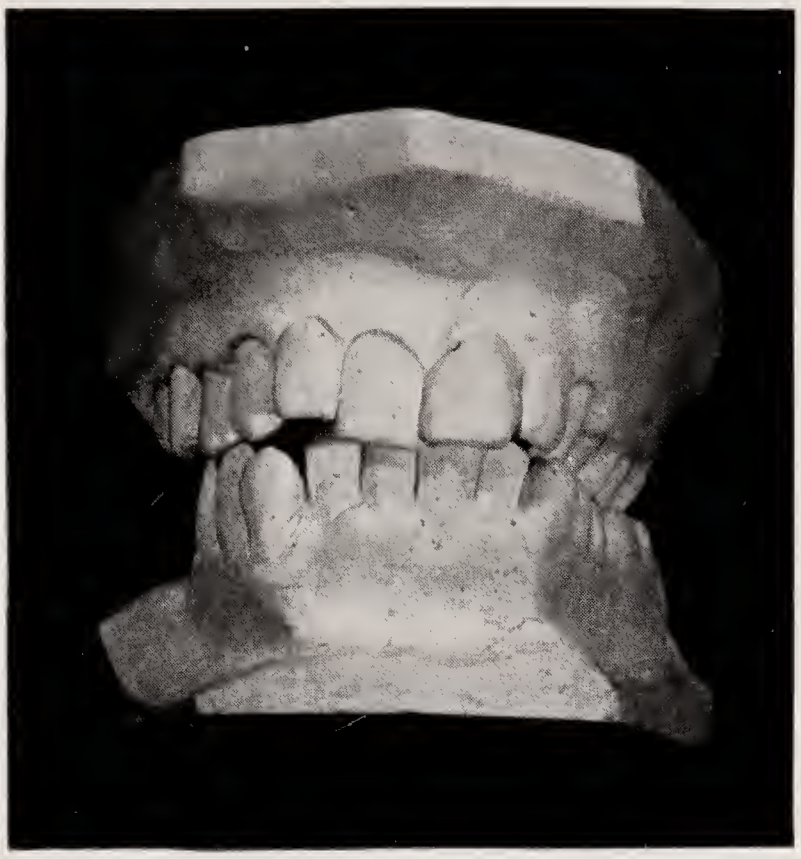

Figure 4.

Figure 5.

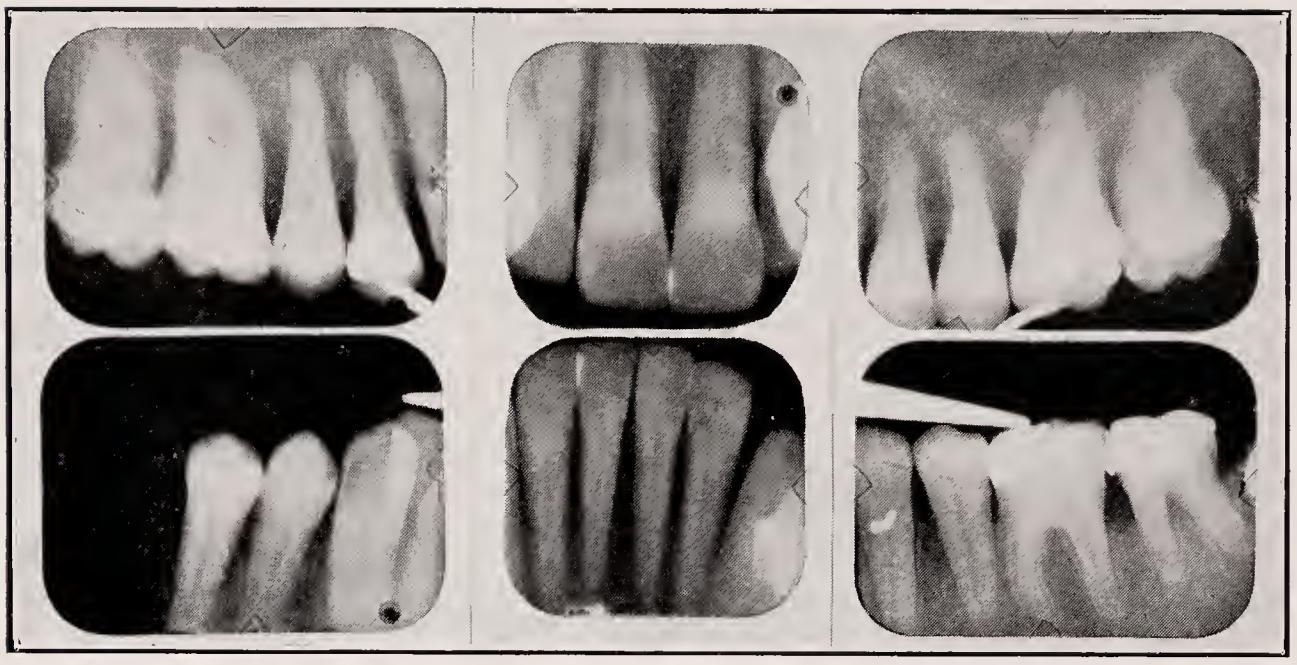

Figure 6.

The reason for the movement is, I think, partly shown in the radiograms (Fig. 6). They were taken quite recently, so that I could see whether the bone was badly damaged. There is loss of the interdental septa, but it is not very bad, and, of course, it may have been partly rarefied by the movement taking place. I am not able to say how much of the damage to the bone was due to the proximity of the radium and how much to preceding pyorrhœa. I think, from a study of the original models, that there had probably been pyorrhœa for some years. The patient was not in a state which would permit of much examination when I first saw him. He had a very sound set of teeth, apparently all quite firm, and I am afraid the other consideration was so important that I really did not go into the question of whether he had any infection of the gums.

On the side where the splints were applied and where all the traction took place there is not a great deal of absorption. The periodontal membrane is thickened, but I think that is due to the extensive movement that took place. I submitted this case to Mr. Harold Round for his opinion, and his comment was that he would not expect the condition in a young man, but he was not surprised at it in an older man, because absorption of the alveolar bone takes place as one gets older, even in the absence of infection. To me the movement seems amazing, in view of the slight evidence of absorption. This case has taught me that orthodontic treatment is not so impossible as it is often thought to be in adults. It will be interesting to see whether, without treatment, there is any tendency to a return to normal. It is so difficult to get things to remain as one puts them in a child that one would expect this to go back very considerably, but there is no sign of it so far.

Discussion

Mrs. Lindsay asked whether there was any sign of regeneration of the necrosed side of the mandible. Professor Pickerill had shown a case of a man of 65 who lost the entire mandible by necrosis, and it was re-formed, and she wondered whether in radium necrosis there was any hope of regeneration.

Mr. M. A. Rushton asked why Mr. Ainsworth had not used the ordinary outside flange on the lower splint. It would not have caused movement of the teeth and, he thought, it was rather more comfortable for the patient when eating. No doubt there had been a good reason.

Mr. G. Northcroft said the case Mr. Ainsworth had described was very interesting to him. He was old enough to realise the extreme difficulty of such cases. He had discovered during the War that it was dangerous to splint too few teeth, and he thought that if the maxillary splint had been made to include the incisors, the movement which had taken place would not have been possible. He thought it was probable in the circumstances that the result obtained was as favourable a one as could have been obtained, but while one did not want to make a splint clumsy, it was well to include as many teeth as possible in the splint if elastic traction were to be used.

The President said he had not quite followed the Communication, in the sense that he did not know what result Mr. Ainsworth had obtained. He understood him to say that half the mandible had been lost, on the right side, and he would like to know how Mr. Ainsworth intended to keep the mandible in the position to which he had brought it. If the condyle had gone on that side and there was a large gap, surely the whole thing would collapse again when the treatment had been completed. With regard to the movement of the teeth, the reason for that was quite clear to him. The jaw was a pyorrhœa jaw from the start, and it was well known that in people of middle age, who had fairly advanced pyorrhœa, the teeth did move. The central incisors became more prominent in some cases and the canines elongated, and if traction was put on teeth like that he would be surprised if there was no movement. He thought the radiographs showed quite clearly that on the right side there was loss of the alveolar process, and he had very rarely seen a case in which there was marked loss in one part of the mouth and not equally severe loss in the other. He therefore thought that all the teeth in the case described by Mr. Ainsworth were infected with pyorrhœa, and the traction put on them would obviously cause them to move.

Mr. G. Northcroft said he did not think the condition of the right-hand side of the mouth as shown in the radiograph was necessarily due to advanced pyorrhœa before the operation, and it was undoubtedly exaggerated by the non-use of that side of the mouth. One could be quite sure that, after the operation, the patient did not use the right side of his mouth when he was wearing the splints. Mastication would have occurred on the left side, and with the disuse of the teeth on the right side and their not being kept very clean, a marked condition such as was shown in the radiograph would very quickly develop, without the patient having had pyorrhœa badly before the operation.

The President said he did not know how far the radium treatment, which had been on the right side, had helped to bring about the condition shown.

Mr. Harold Chapman asked whether Mr. Ainsworth could say how much pressure was exerted by the elastic band. That would give the amount of pressure which the elastic band had to overcome to keep the mandible in its proper position. That was an important point in connection with the movement of the teeth.

Mr. S. A. Riddett said he would like to know what the subsequent treatment was to be. Presumably Mr. Kilner was going to operate further, by bone grafting or something of that kind.

Mr. N. J. Ainsworth, in replying to the discussion, said there was no sign yet of regeneration of the part of the jaw that was missing. He believed it was notorious that regeneration was very slow in the case of radium necrosis. Radium seemed to delay healing in all the tissues, hard and soft. He had thought at first of using the outside flange on the lower splint, but, owing to the difficulty the patient had in opening his mouth, it would have been extremely difficult to construct one which would not be too high at the time and yet would be efficient when the patient was able once more to open his mouth more widely. He had been afraid that, if a flange were made, it would dig into the gum above the splint in the upper jaw if it was deep enough to be proof against coming apart later on when the patient could open his mouth further. Possibly the elastic was a mistake. The surgeon in the case did not want to have a flange, but, if he had told him that it would be the best thing to have, he thought the surgeon would have given way. It was a question whether it would have been the right thing or not. He did not agree that the flange would have prevented the movement of the teeth, because, after all, the action of the elastic was only to overcome the traction exerted by the contracting of the scar tissue, and the flange would have done the same. The damage was done not by the elastic but by the pull of the scar tissue. With regard to Mr. Northcroft's remarks about taking as many teeth as possible into the splint, he had learned now that he should have splinted the whole of the upper jaw. (He could not get the lower splint in, and he had to cut that in half.) He had not thought, however, that one elastic would make such an appalling change in the shape of the mouth; he had never seen it happen before. On looking at the models, he thought it was clear that the pyorrhœa was of long standing. The models taken before the operation showed that there was very little damage done to the gum. It was not an obvious case of pyorrhœa; it was a case in which the pyorrhœa could be missed if one was thinking of other things. He did not agree with the President that it was an advanced case. The condition might be partly due to the radium treatment, but he thought it was probably not that but pre-existent. The reason for the treatment was first of all to prevent a grosser deformity due to the uncontrolled action of the scar tissue, and, secondly, to serve as a preliminary to bone graft, which had not yet been done, because the patient had a fistula which it was hoped would close. The photograph which showed the teeth in fairly good relationship with regard to the central line had been taken when there was no control of the fragment at all. He did not know how to estimate the pressure exerted by the elastic band, but he had used a band about an inch long, and it was stretched to slightly over double that length, so he did not think it exerted a very great pressure; in fact, it did not suffice to bring the occlusion quite back to central, and the patient doubled it by putting on another elastic.

Dr. RUBBRECHT'S STUDIES ON

Sagittal Maxillo-Facial Variations and Heredity*

By L. Lindsay, L.D.S.Edin.

AT a time when the Dental Committee of the Medical Research Council has issued its report on "Investigations into the Nature and Characteristic Features of Post-normal Occlusion," conducted by Dr. M. Young, Mrs. Elsa Johnson, Miss Smyth and Miss Still, it seemed appropriate to give a résumé of the work by Dr. O. Rubbrecht in the *Revue Belge de Stomatologie* 1930, and *L'Orthodontie Française* 1933.

The author has been kind enough to allow me to publish illustrations from his original work and has introduced some new ones. He has added to this kindness by revising the subject matter and completing it by recent observations which serve to confirm the results of his investigations.

As you are aware, Rubbrecht published an extensive study on the familial facial type in the Habsburg line, which was inspired by the work of Galippe on the same subject, that is inferior protrusion, which the latter regarded as a sign of degeneracy. Angle regarded his Class III on the other hand as produced by enlarged tonsils, and some years ago I was tempted by the experiments of C. Breitner to show such a condition on the part of the young child.

A study of this work of Dr. Rubbrecht as well as the teaching of Mr. Chapman, have shown me how rash I was to attempt anything of the kind, and what I am endeavouring to place before you is nothing of my own, but an attempt to fulfil my undertaking to our indefatigable programme secretary in the matter of foreign literature.

By a series of cephalometric measurements, Rubbrecht has shown that it is not necessary to consider the position of certain teeth in the jaws, but that it is necessary to consider certain features belonging to both the jaws which maintain such characteristics whether the teeth be present or absent.

* Read before the Society, November, 1937.

Rubbrecht follows the principle established in 1915 by van Loon, according to which diagnoses of jaw anomalies must essentially be made in reference to cranial points and points of the face situated outside the denture: he studies the jaw characters above all things in accordance with their relation to those cephalometric characters. For this purpose measurements and projections of measurements starting from these points are noted on the figures.

The genesis of anomalies of occlusion and the part played by heredity cannot be grasped by the genealogic method unless variations of the jaws of representatives of the same generation and of their descendants are included in the examination, for which at least three generations must be studied. For his measurements, Rubbrecht takes the two tragions, the two orbital points, the nasion, the subnasal, the prosthion, the intradental, the gnathion and the gonion—on the left side. This method has its imperfections, but it gives sufficient evidence in the study of maxillo-facial variations.

Fig. 1.

Studies in morphology of the prognathous mandible show that there is a considerable amount of variation. The sum of the variations in form oscillates between two extremes. In one, the mandible nearly preserves its normal shape as in the portrait of Frederic III (Fig. 1), Emperor of Germany 1415-1493. In the other, the angle of the mandible is scarcely indicated, the ascending ramus is very oblique, sloping downwards towards the chin ; this is seen in the portrait of Maximilian I (Fig. 2) Emperor of Germany 1459-1519, and son of Frederic III.

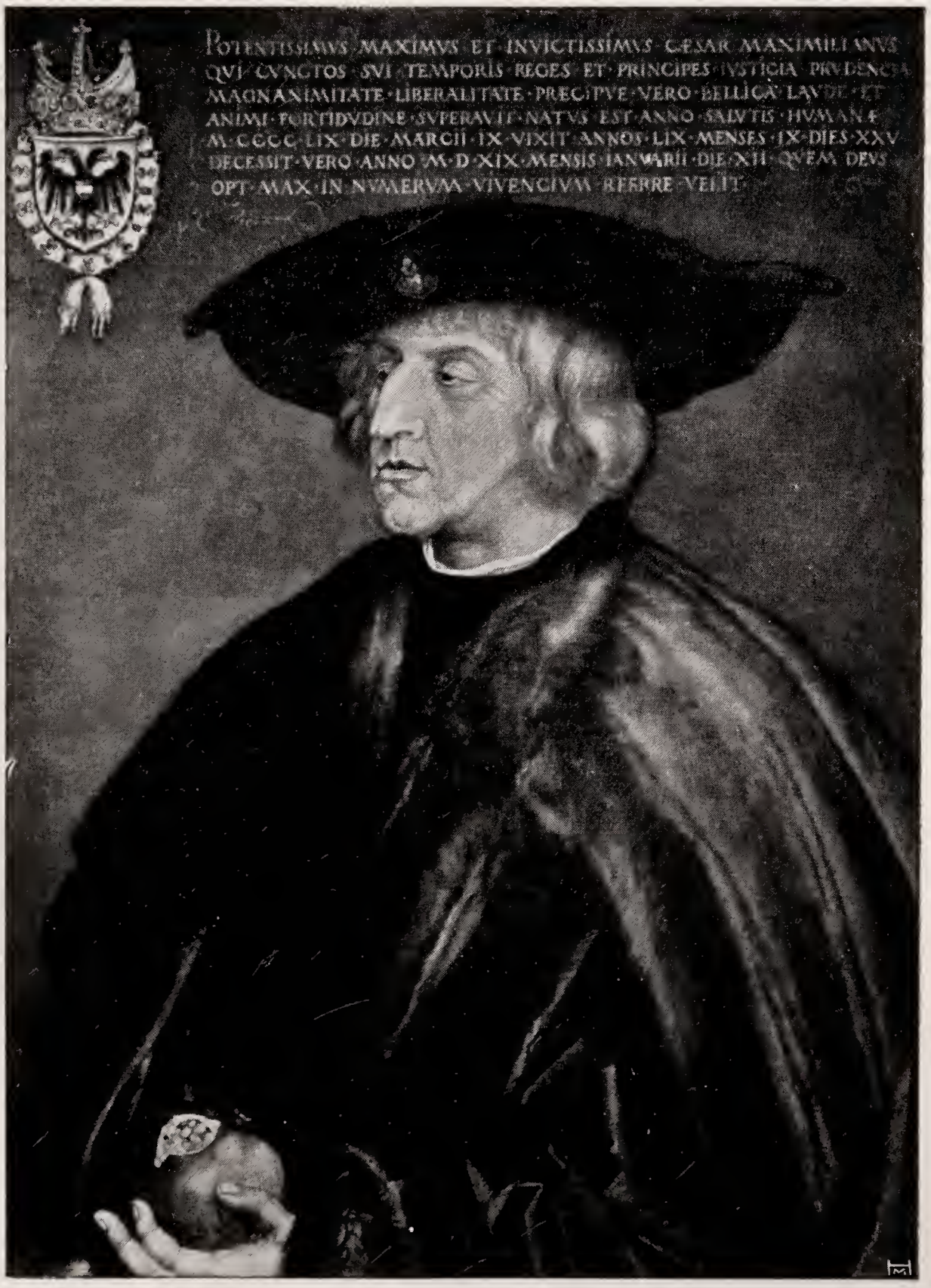
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Fig. 2.

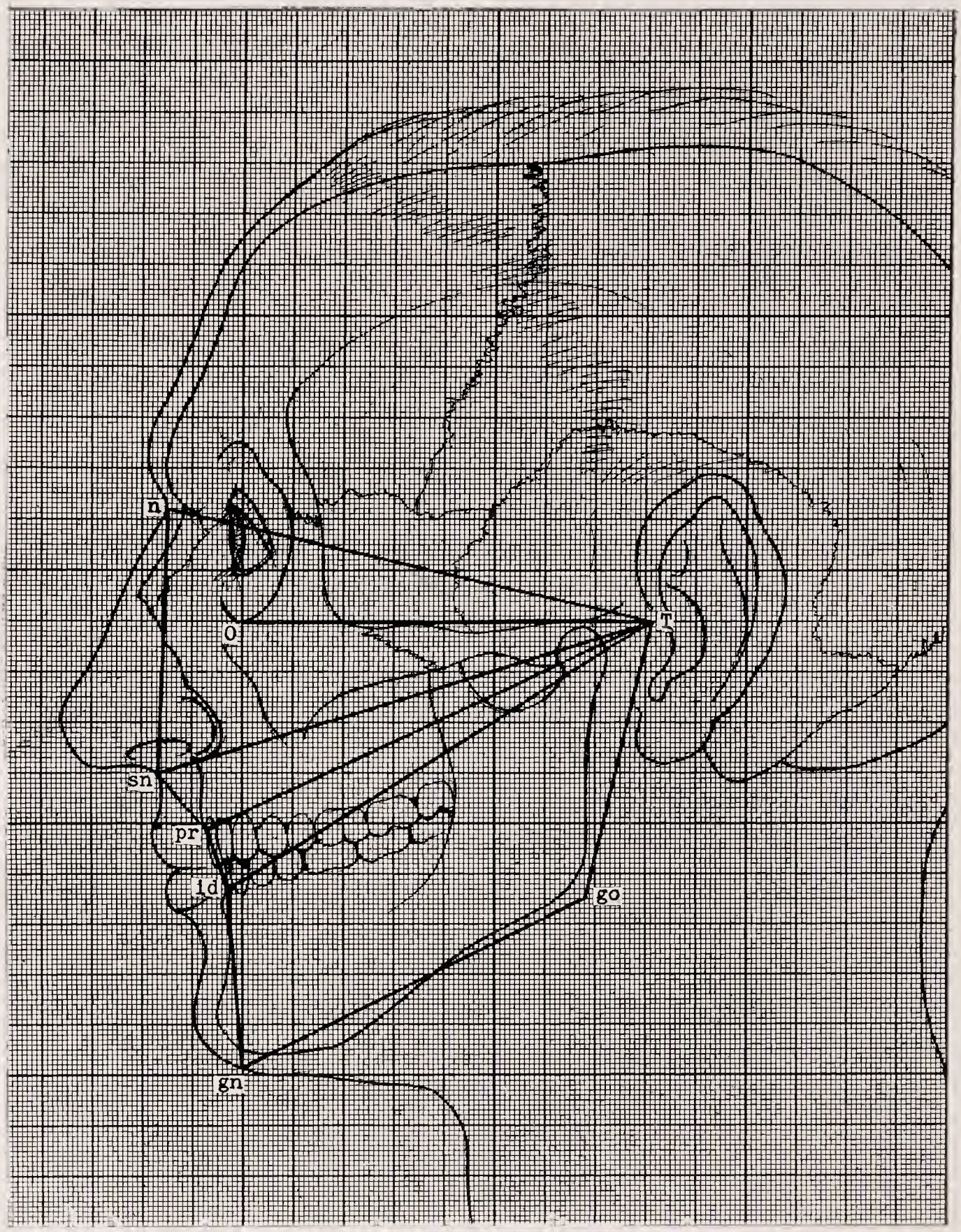


Fig. 3.

Fig. 3 is a sagittal diagram of the adult normal around which the head has been reconstructed. Fig. 4 is the same without the reconstruction. The author uses this in the figures following for comparison in diagnosis.

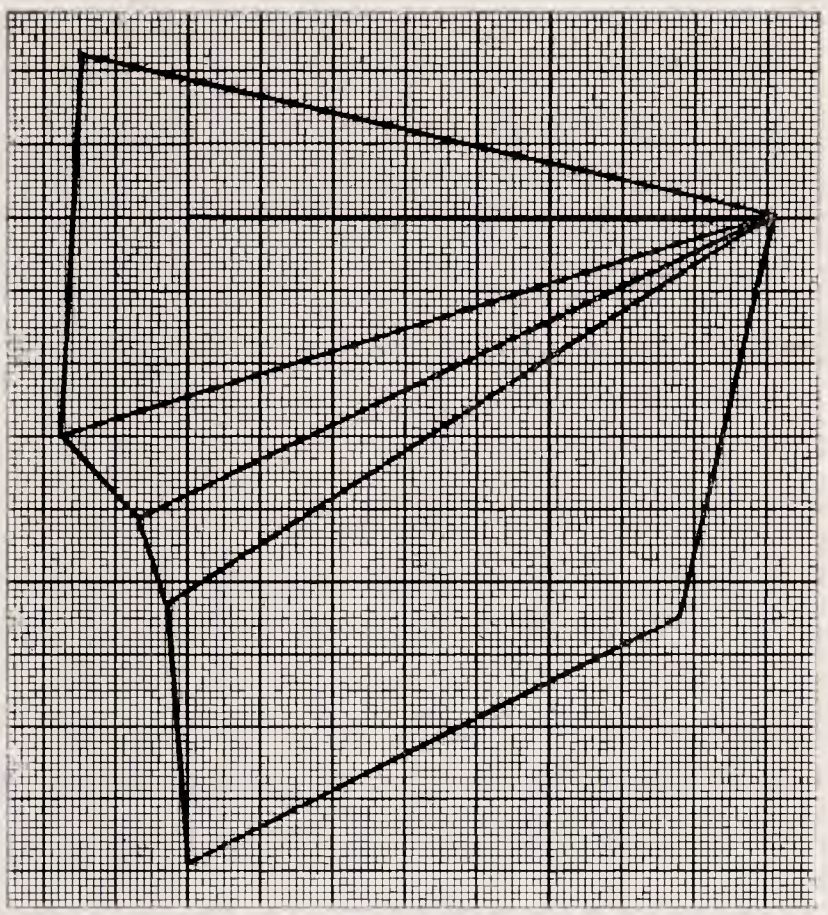


Fig. 4.

It might be objected that the author has taken as a basis for diagnosis only one diagram of the normal and used it for adults and young persons alike, when the normal profile varies and is not the same at all ages.

The diagrams published by De Coster* giving the principal cephalometric characters at different ages and interesting from the orthodontist's point of view, supply the answer to this objection. This author showed diagrams of the normal adult, a child of 4, from 6 to 8 years, from 8-12 years, from 12-15, and from 15-20 years. Only that of the 4-year old child differs notably from the others as to cephalometric characters bearing particularly on the subject of this paper.

In the present diagram (Fig. 4), the prosthion is 7 mm. anterior to the fronto-orbital plane and the infradental 2 mm. anterior to this plane. The position of these points is approximately the same in the diagram of the normal adult of De Coster, and in that of persons of 15 to 20 years of age. From 6-15 years the infradental is exactly in the fronto-orbital plane. It is necessary to take into account in diagnosis the difference in position of the infradental noted at this age. From 12 years of age the position of the prosthion in relation to the fronto-orbital plane in the different diagrams is approximately the same as that of the adult. The variations of the nasion and subnasal points are slight.

* DE COSTER, L. (1935) L'Orthodontie à base d'acier. Masson & Cie, Paris, pp. 116-121.

The position of the gnathion undergoes considerable individual variations.

The diagrams published by Rubbrecht comprises four regions or zones. The uppermost is bordered in front by the nasion and the subnasal points and encloses the left orbital point. The author calls this the naso-orbital region. The second zone corresponds for the most part with the maxilla : it is called the superior maxillary zone or region. The third zone gives information as to the nature of the occlusion and is called the dental zone. The fourth zone is the inferior maxillary zone or region.

Inferior Protrusion and Superior Retrusion.

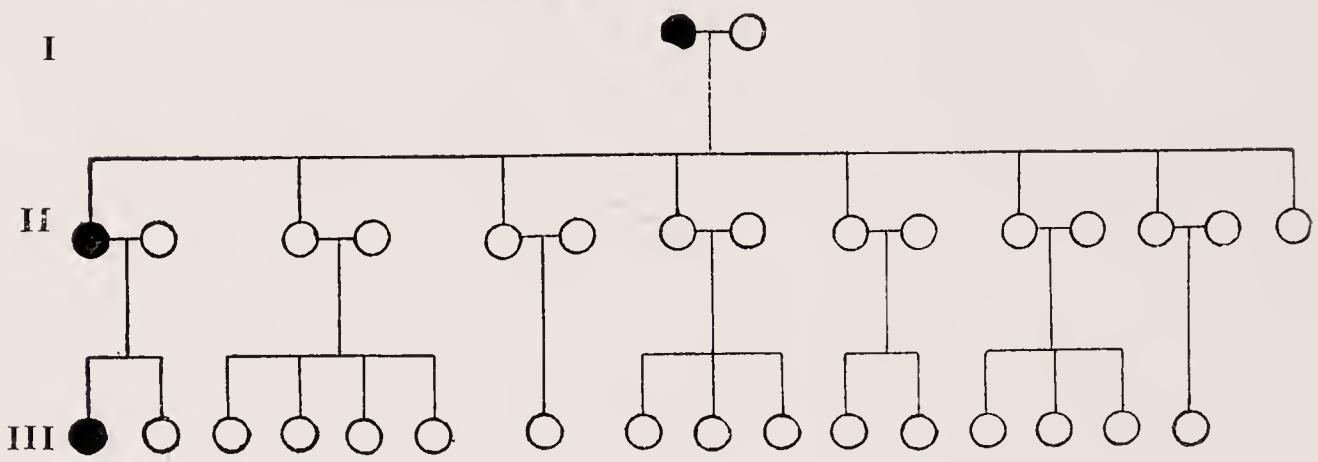


Fig. 5.

The genealogy shown is in three generations. The diagrams (Fig. 6) are drawn to scale. No.1, 1 is the grandmother ; the diagram on the right is that of the grandfather—approximately normal—the naso-orbital zone and the inferior maxillary zones resemble each other in the two diagrams. These two parts are normal in the grandmother and it is not possible to say that the distal position of the upper jaw is due to an abnormal size of the mandible. The prosthion in the grandmother is much further to the distal than that of the grandfather ; it is also distal to the fronto-orbital plane. This is a case of superior retrusion.

Generation II, **1.**—Class III, division 1. Age 45 years. The nasion and gnathion are almost normal ; the prosthion is very far back, thus a case of marked superior retrusion. The infradental is carried, like the foregoing, very far back. This position is due to the fact that the person wears a complete set of dentures in which, in order to place the teeth in correct anatomical occlusion, it was necessary to place the lower incisors well back. The rest of the mandible approaches the average. The person is emphatic as to the position of the natural teeth—that the lowers were in front of the uppers, covering at least the lower half of their crowns. The diagram on the right is that of the husband.

Generation III, **1.**—Class III, division 1. Superior retrusion with a mandible approximately normal. The diagram to the right is that of a sister of 10 years, who later developed inferior protrusion.

I.1

I.2

II.1

II.2

III.1

III.2

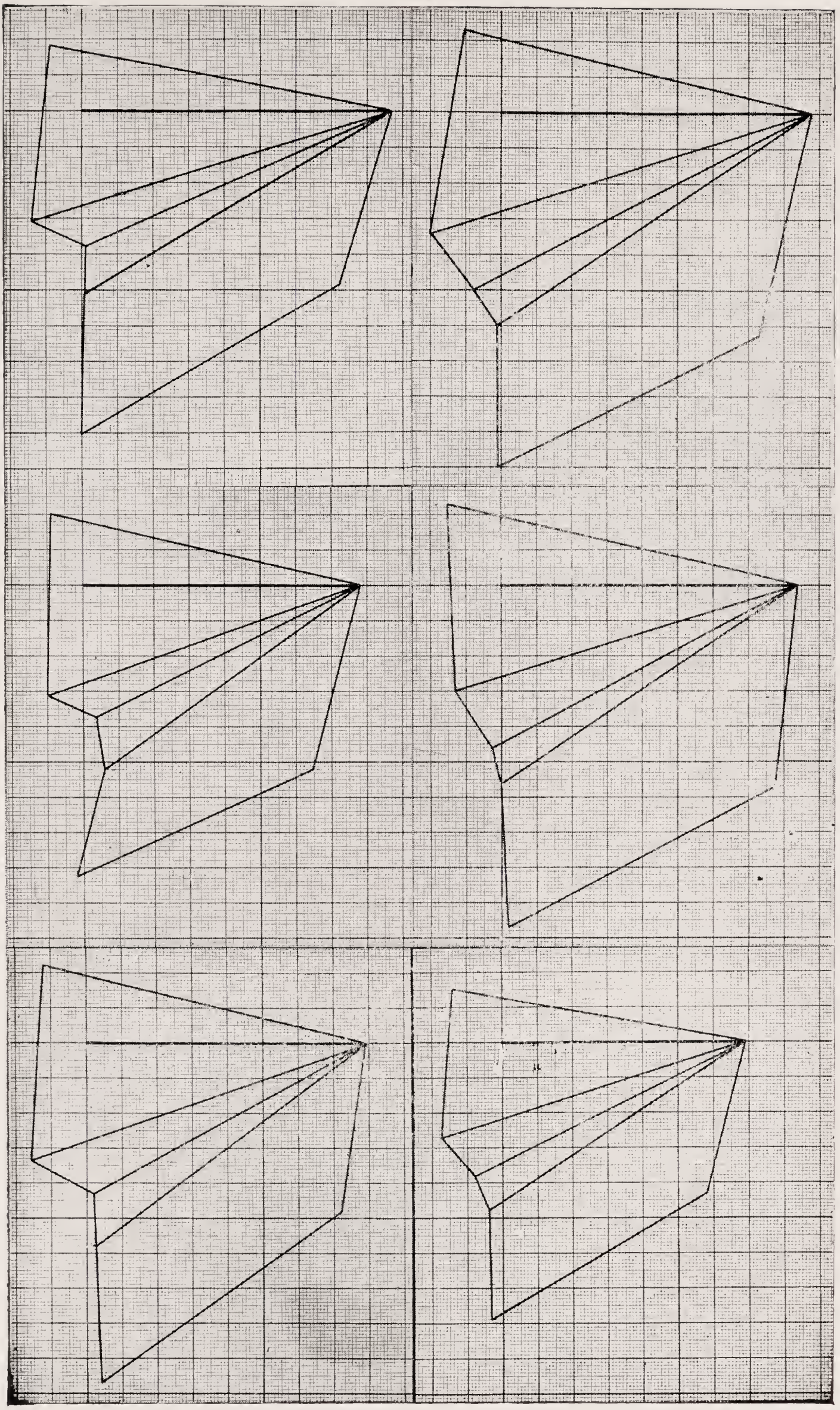


Fig. 6.

Thus there is superior retrusion in three persons, in three generations with an approximately normal mandible of medium size. The superior maxillary zone is larger in the grandmother than in her daughter, but is of the same shape in both.

Note that in the diagrams on the right, there is a total absence of this character of retrusion.

There may be intermediate cases, and it is sometimes impossible to draw a line at which superior retrusion ends and inferior protrusion begins. These diverse forms may exist in the same family or may indeed alternate in successive generations. Thus there is the possibility of an hereditary link between the two conditions.

Second Genealogical Tree (Fig. 7).

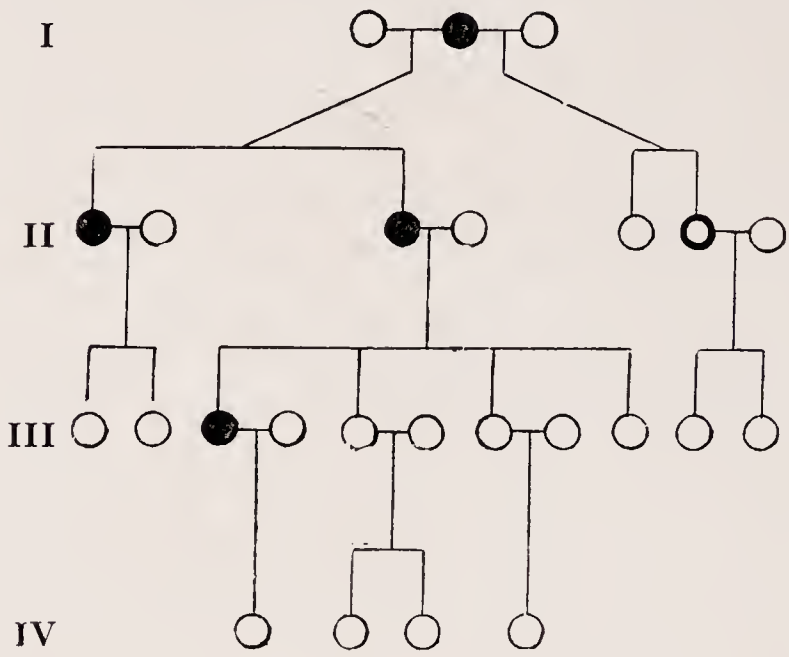


Fig. 7.

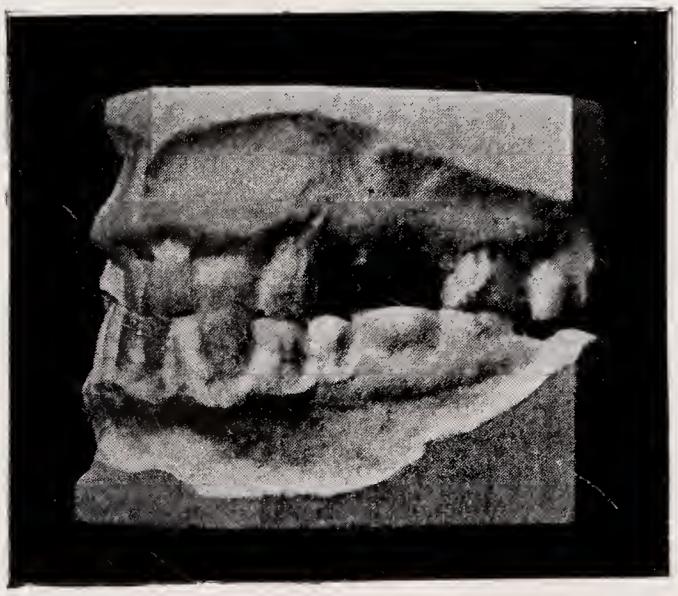
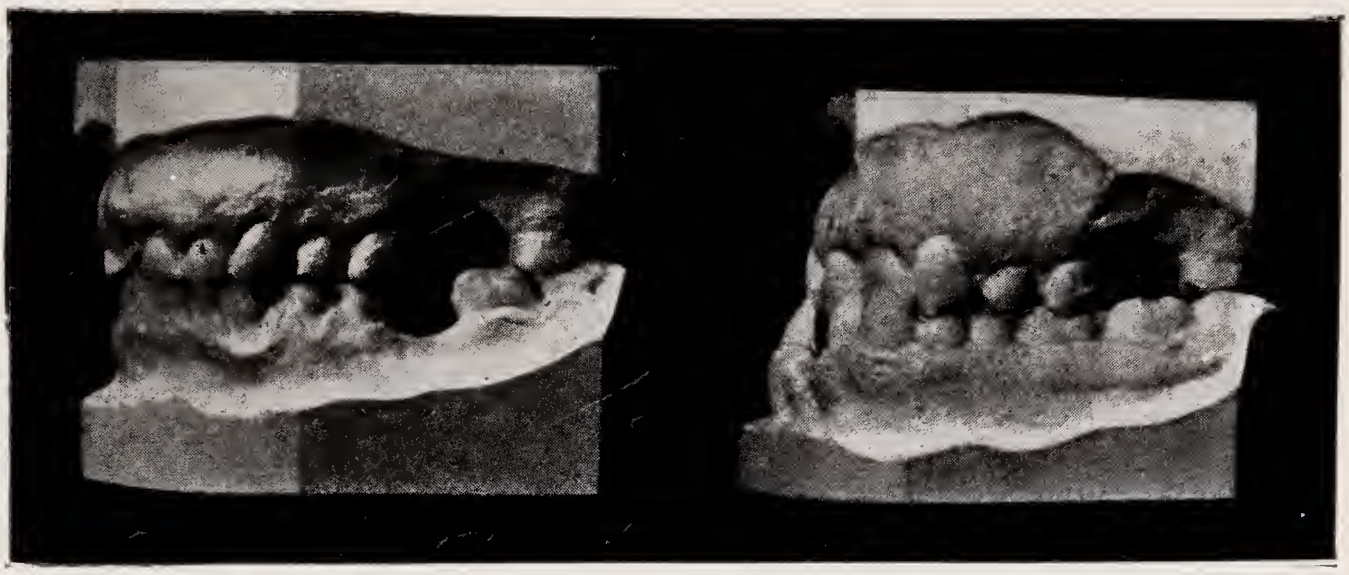


Fig. 8.

Generation II, **1** (*Fig.* 8), is a case of Class III, division 1 ; the patient is 59 years of age—| 7 and | 8 have moved forwards after extraction of the | 6. In the diagram it will be seen that the prosthion is distal to normal. The mandibles of this and the others below and to the left are massive, and contrast strikingly with II, **4** and III, **5**. The inferior maxillary zones of II, **1**, II, **3** and III, **3,** have the same conformation.

II.3



III.3

Fig. 9.

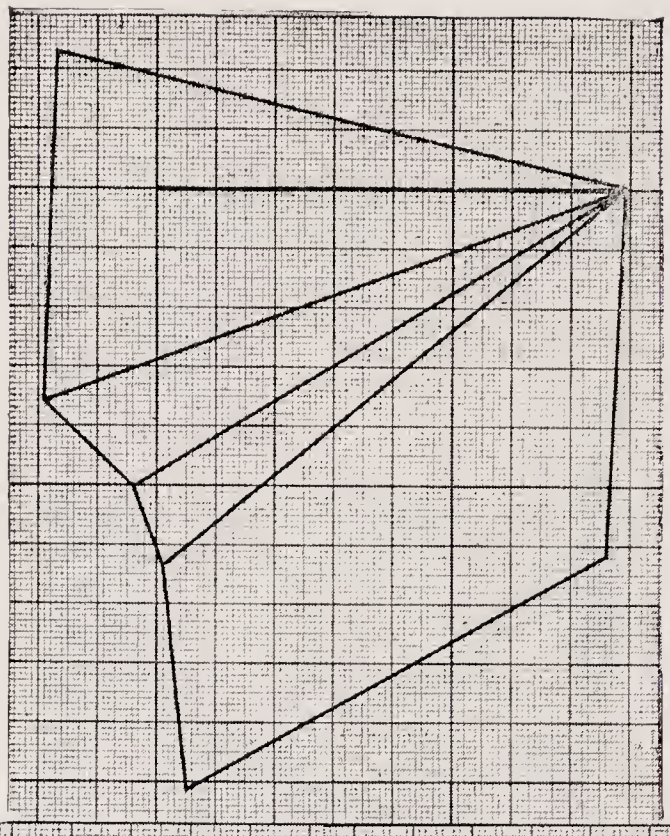
II, **3** (Fig. 9), is a Class I and looks as if it has no connection with an inferior protrusion. This person is the son and father of an inferior protrusion. Has inferior protrusion jumped a generation ? On examination, it will be seen that the prosthion is distal to the fronto-orbital plane. It is really a case of superior retrusion ; the ascending ramus is long. Nearly vertical in his brother, No. 1 of the same generation, the ramus is absolutely vertical and the whole mandible is carried extensively backwards. Thus there is retrusion in both jaws.

II, **4** is the wife of **3**.

Generation III, **3** (*Fig.* 9).—Class III, division 1 ; upper laterals missing and three lower incisors ; close bite ; the sub-nasal prosthion line is more oblique than in the diagram of the normal, the infradental and the gnathion are notably anterior to the fronto-orbital plane. Inferior protrusion with slight superior retrusion. The angle of the mandible is greatly anterior to that of the father. These three mandibles—father, son and uncle have approximately the same size and form. Between superior maxillary and inferior maxillary zones in the three, which are greatly similar, there is interposed a dental zone which differs in each case ; high in the first case and low in the others.

Does the character of the intermediary zones explain the differences between the relations of the regions situated immediately above and below them ?

The consideration of a case of inferior protrusion in a child of three and a half years gives an answer to this. At the moment



I.II

II.3

II.4

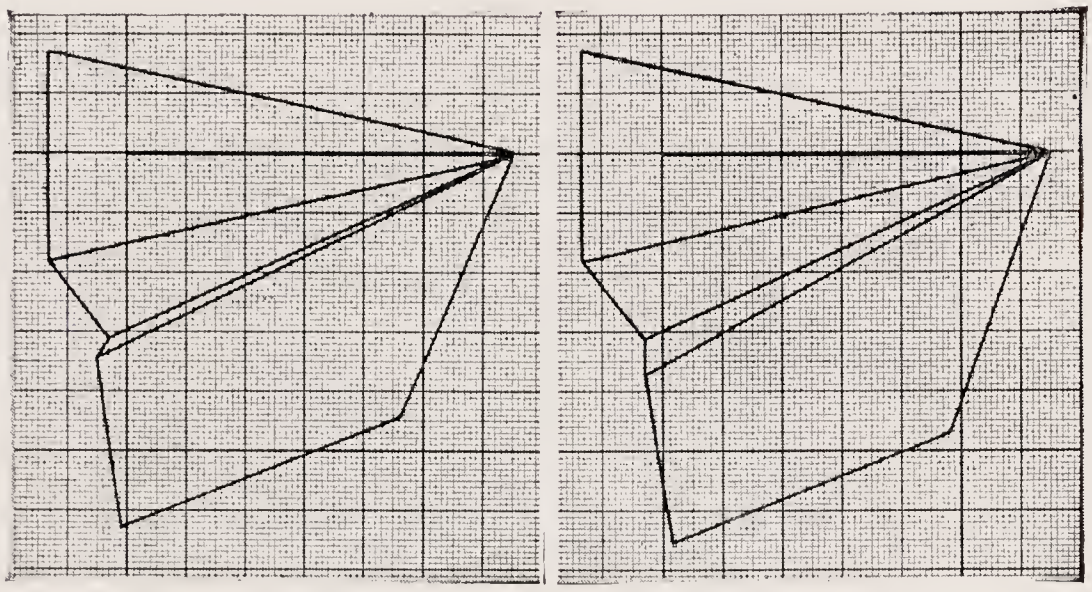
III.3

III.5

Fig. 10.

of closing the mouth the incisors meet edge to edge; further closure brings the molars into occlusion and there is a swing forwards of the whole jaw, making a close bite with the lower incisors well in front of the uppers. The conditions before and after treatment are seen in the diagrams A and B, Fig. 11.

A.



B.

Fig. 11.

The first diagram corresponds to III **3** of Fig. 10. The treatment consisted in extensive grinding of the upper canines with slight grinding of the lowers and the insertion of an inclined plane on the lower incisors and canines; the bite was opened and resembles the condition II **1** of Fig. 10.

The type of occlusion is not an essential in considering heredity. It may vary, although the characters of size and form of the jaws remain approximately constant.

III, **5** (Fig. 10), is a sister of **3,** a striking contrast to the brother and uncle.

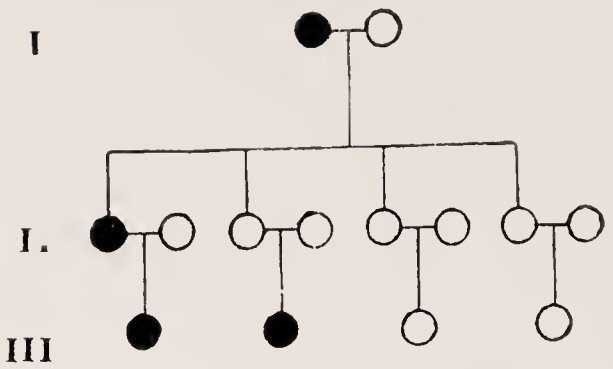


Fig. 12.

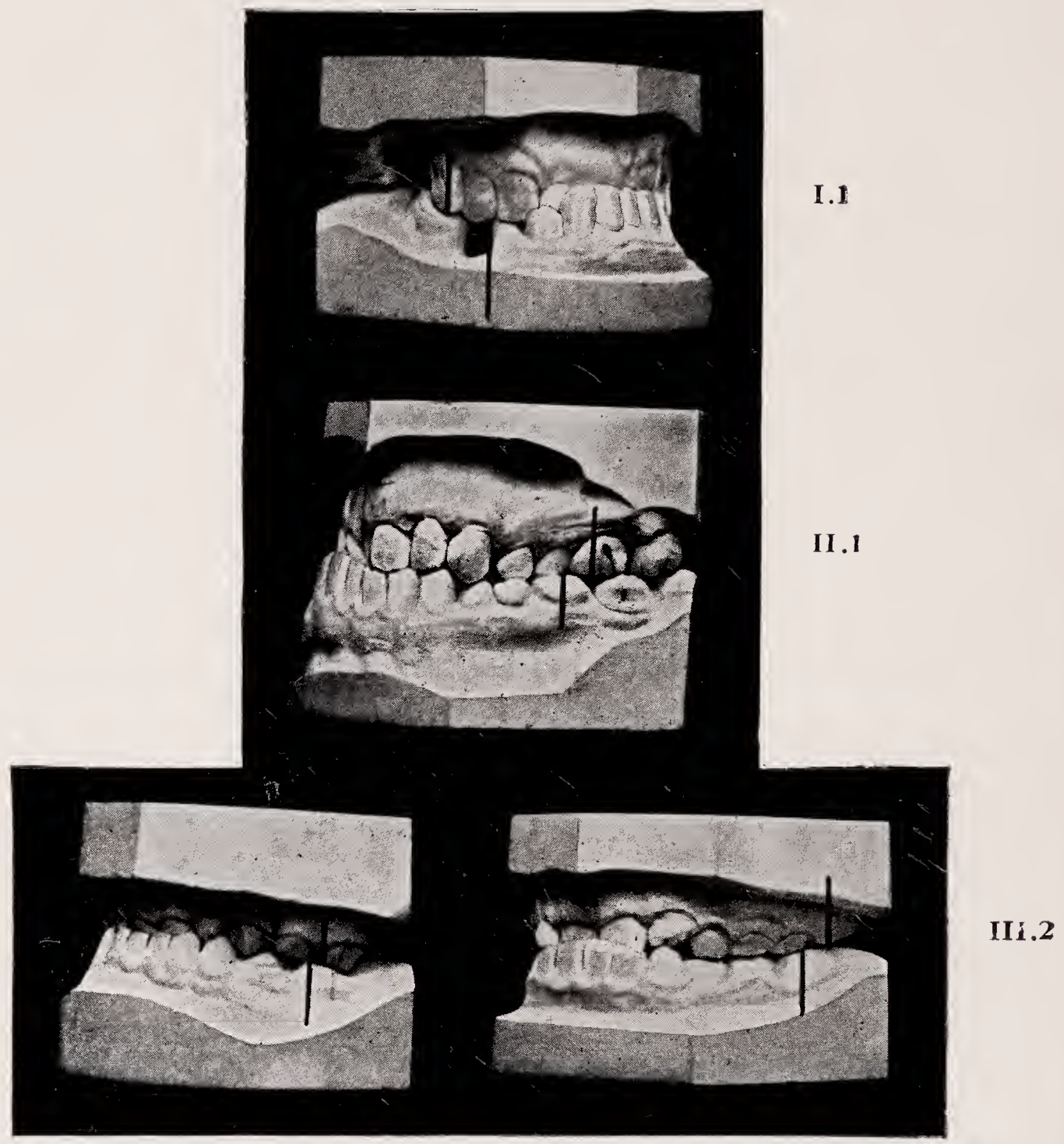


Fig. 13.

Third Genealogical Tree (Figs. 12 and 13).

I, **1**—Class III, division 1 ; close-bite.

II, **1**—Class III, division 1.

III, **1**—Deciduous dentition : lower antero-occlusion.

III, **2**—Class III, division 1.

Heredity exercises an influence on the characters of relative size and shape. The importance of size is above all evident in certain cases of true inferior protrusion. The maxilla in these cases is approximately normal and morphological variation depends largely on the considerable development of the mandible. Therefore it is not astonishing that a large proportion of big mandibles appear in the cases of inferior protrusion. The size of the maxilla, in maxillary retrusion, and that of the prognathous mandible is not absolute. A maxilla which is the cause of retrusion in one mouth may not be so in another. In the same way, a mandible which is the cause of protrusion in one mouth may not be so in another.

The character, constituted by the shape, plays also a part in inferior protrusion and in maxillary retrusion. This is so especially in cases of pronounced maxillary retrusion. Here we find the prosthion far too distal. The sub-nasal point is also posterior but much less so than the prosthion. A maxilla with this kind of retrusion has a shape which differs markedly from a normal maxilla.

It is further not sufficient, whether there is inferior protrusion or superior retrusion, that a mandible should be large in relation to the maxilla ; this size must be manifest sagittally ; this condition implies a conception of form. We have seen maxillary zones of the same shape in the course of successive generations, or rather examples of the same type reproduced in different sizes. Such identity shows that heredity has a predominant influence upon shape.

The special characters of size and shape may affect either the upper or the lower jaw or it may be both jaws simultaneously. The factor underlying this is a hereditary growth factor which manifests itself in a lengthening and by an extension sagittally. When development proceeds on what are considered normal lines the dental arches are placed in normal relations, not only as regards the other facial bones, but with each other, in such a way as to produce what is considered normal occlusion.

Thus, the idiovariation which results in inferior protrusion and superior retrusion is produced by a retardation of this lengthening of the maxillæ in the course of development in relation to that of the mandible in a sagittal direction, which may not be other than normal, but the maxillæ in consequence of this retardation are

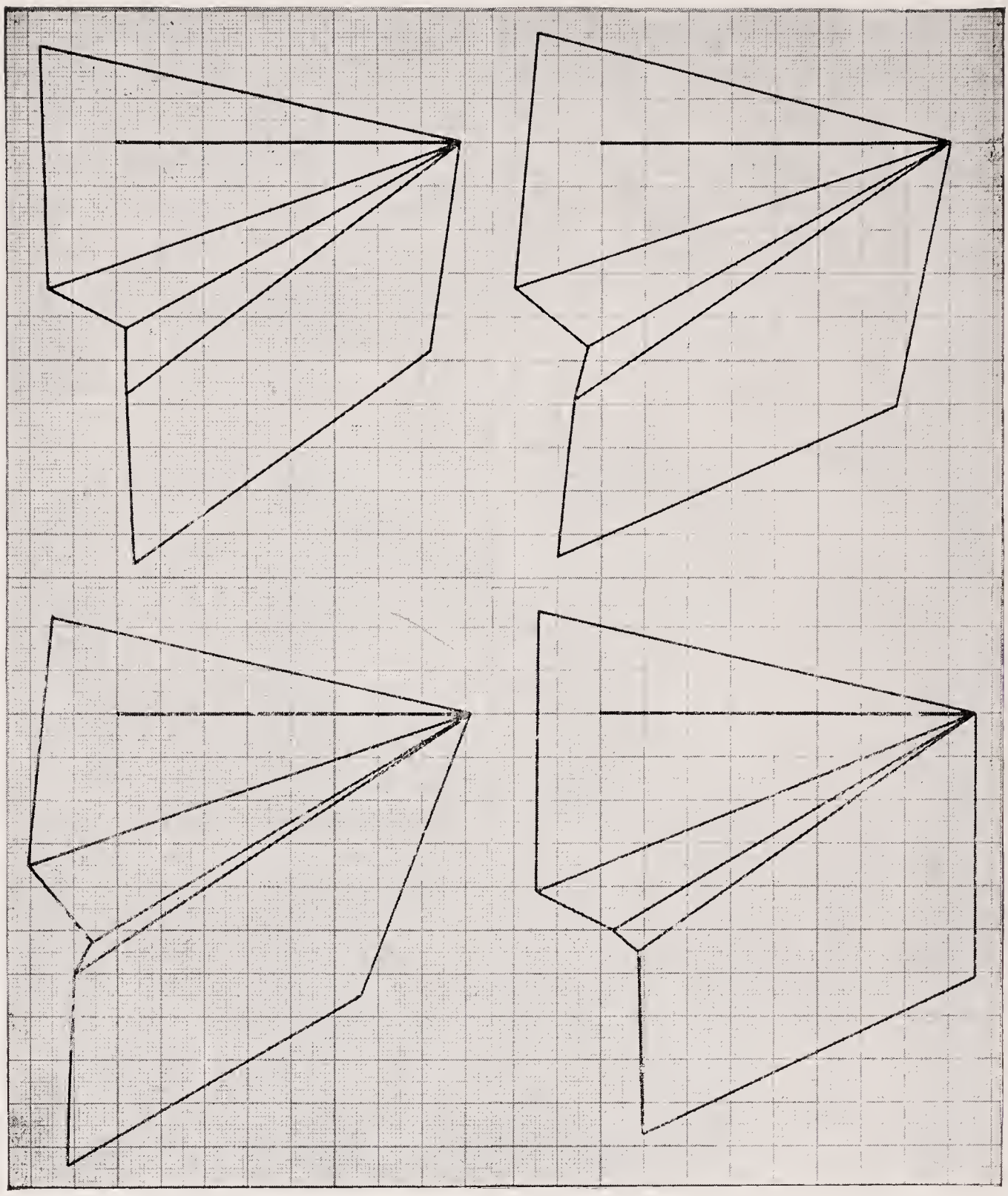


Fig. 14.

in a distal position, that is to say there is maxillary retrusion. (Fig. 14A). In other cases the maxillæ may be normal in development and the mandible exceed its normal limits, that is to say there is inferior protrusion without superior retrusion (C). Again, when local influences come into play, the growth of the mandible anteriorly is impeded and it may develop backwards abnormally and the clinical aspect is that of Class I ; the occlusion may even be correct, with both the jaws in positions sagittally of an accentuated retrusion (D). There are intermediaries, such as B, where there is true inferior protrusion with slight superior retrusion.

Exogenous forces may affect these conditions, and in cases of superior retrusion or inferior protrusion, the mandible is more susceptible than the maxillæ to such influences. In this, the occlusion plays considerable part.

At its inception, inferior protrusion is often produced more by a swinging forwards of the mandible than by the difference in size and shape of the jaws—modifications of the shape of the lower jaw is produced by the type and height of the occlusion which may react upon the angle, rendering it more oblique, bringing the body of the jaw more to the front. General factors, diminishing the resistance of the bone may combine with mechanical factors in effacing the angle. This suggests an explanation of the difference between the form of the mandible of Frederic III and his son, Maximilian I.

Inferior Retrusion and Superior Protrusion

It is becoming more and more general to admit that heredity plays a considerable part in the origin of inferior protrusion and superior retrusion. It is not the same with inferior retrusion and superior protrusion.

There are many authors who are still of the opinion that heredity has no influence upon the genesis of these anatomical variations ; others, on the contrary, admit that this influence is considerable, among whom Dr. Rubbrecht is to be ranged.

This divergence of views, and the recent publication of the Dental Committee of the Medical Research Council of the "Investigation into the Nature and Characteristic Features of Postnormal Occlusion," give at this moment a great interest to the researches upon the influence of heredity in the genesis of postnormal occlusion. Dr. Rubbrecht gives in this article some considerations which were not in his former work. He has added to illustrate this, Figs. 17 and 18, which together with Fig. 19 would impress even those least disposed to admit a hereditary influence in the ætiology of distal occlusion.

Angle Class II comprises cases of inferior retrusion or superior protrusion. While bad habits are undoubtedly one of the causes of this condition, the proportion of cases is not great. Another favourite cause among authors is adenoids and mouth-breathing. Rubbrecht finds that in his genealogical tables, there are no cases of this kind. There were families where adenoids were present associated with this condition and, at the same time, those which had quite other occlusions associated with adenoids. He finds that in the cases of Class II, division 1, treated by him, 34.6 per cent had adenoids. O. Meyer (Basel), in an investigation based on the observation of 100 cases of anatomically correct occlusions, found that in 33 cases there were adenoids.

The same facts appear in the tables of inferior retrusion and superior protrusion as in those first studied of the opposite relations. These conditions recur in successive generations. It must be borne in mind, however, that these cases are not strictly hereditary from a theoretical point of view, but one or the other appears in a variation which has an hereditary character involving both jaws. This depends on the fact that the extension of the lower jaw forwards has been retarded in the course of evolution, and remains so in relation to the development of the upper jaw in an antero-posterior direction.

If the upper jaw does not exceed its normal limits forwards, and the lower jaw, as a result of retardation, remains distal, there is

inferior retrusion. If the lower jaw reaches full development but the upper exceeds normal limits, there is superior protrusion without inferior retrusion, but two conditions may be present simultaneously.

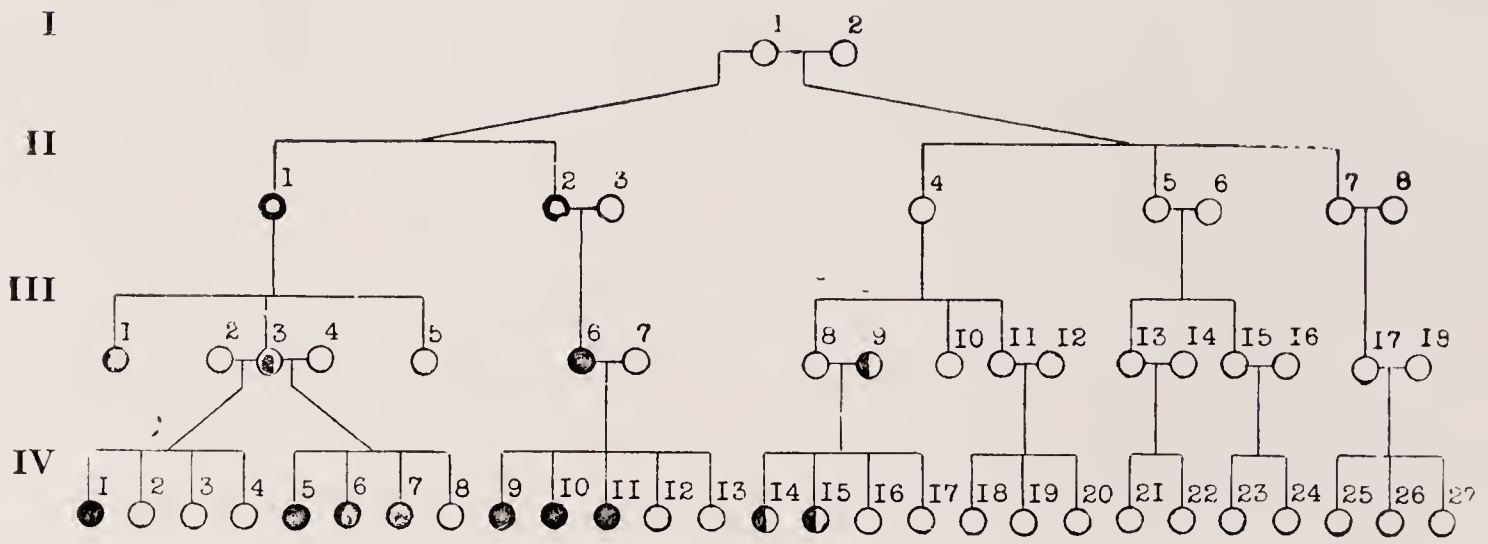


Fig. 15.

Fig. 15 shows a genealogical tree of three generations.

Generation I 1 represents a great grandmother who married twice. There is a good portrait of her, which shows that her features were regular. According to the testimony of one of her children, she had very fine, regular teeth.

Generation II. Rubbrecht knew Nos. 1 and 2, and was able to examine photographs of these persons. Their mouths showed characteristics of inferior retrusion. In No. 1, the mandible was very small and the maxillæ prominent in relation to it. In No. 2 there were standing $\overline{3\ 2\ 1\ |\ 1\ 2}$, and the alveolus which carried them was much inclined from below upwards and from behind forwards, a frequent condition in inferior retrusion. The mandible was small with receding chin.

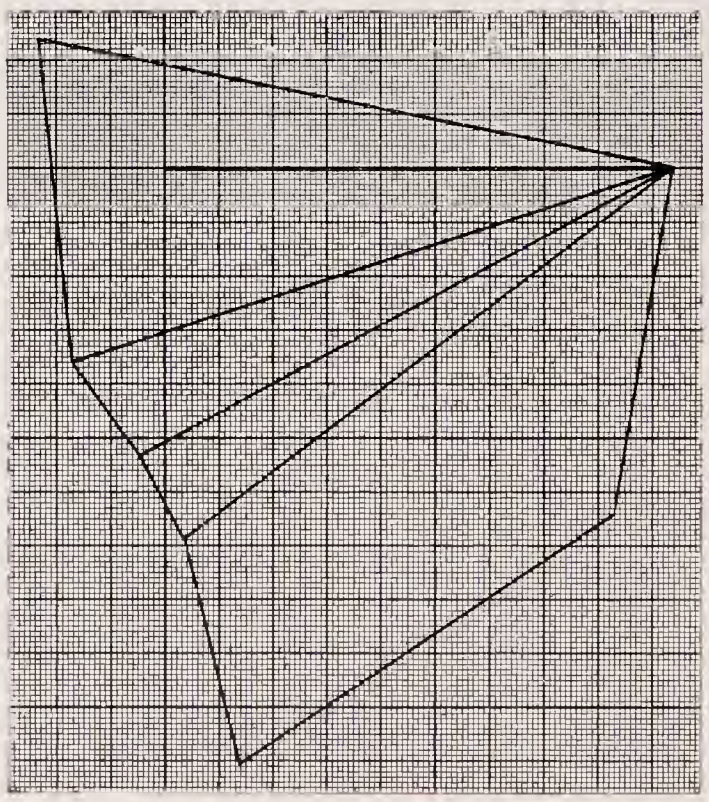


Fig. 16.

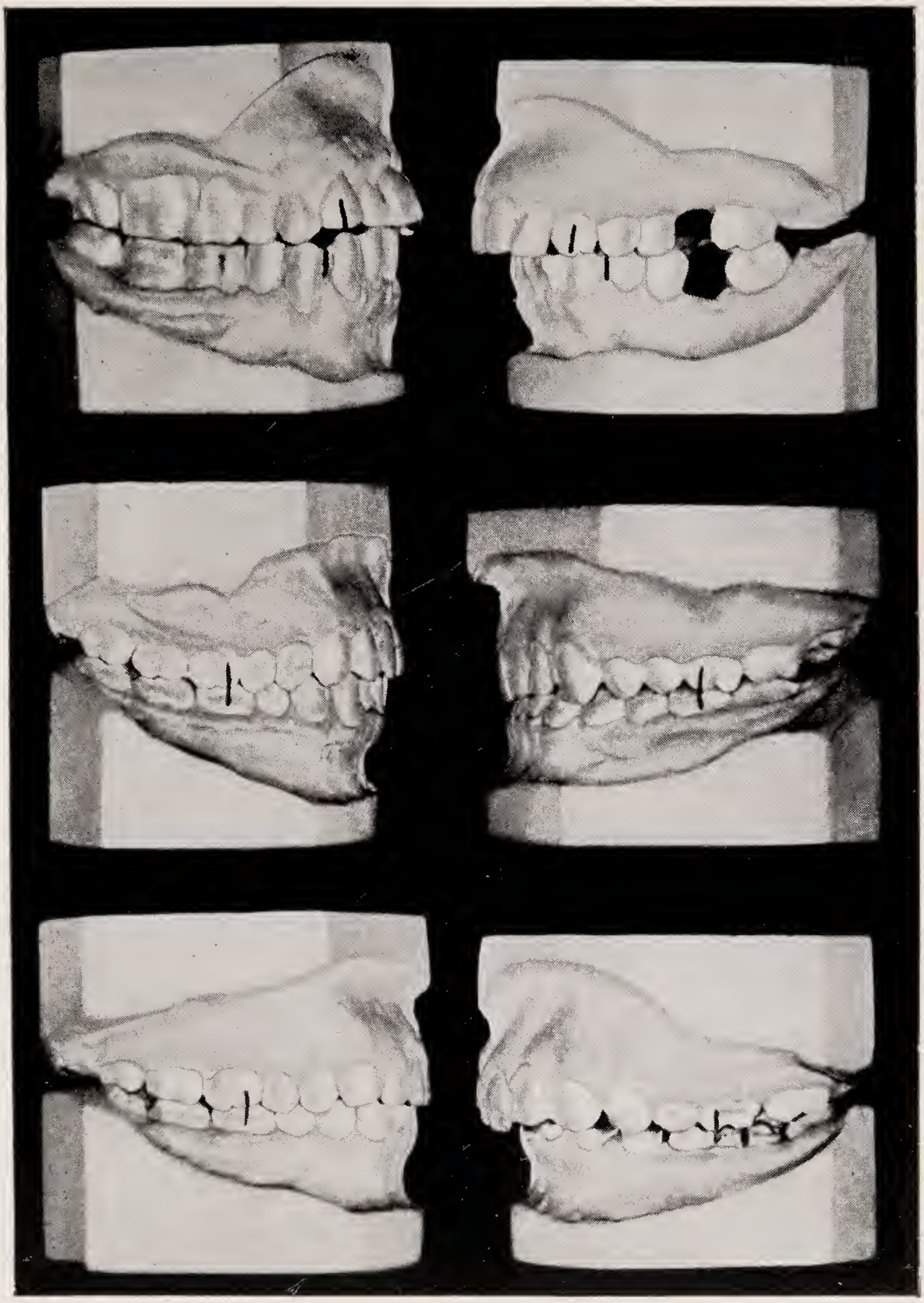


Fig. 17.

Generation III. No. 1 is a case of Class II, division 1 (Fig. 17). Fig. 16 shows the diagram and Fig. 17 models of III 3. The diagram shows pronounced inferior retrusion, the infradental being 5 mm. posterior to its normal position.

The occlusion is almost a Class II, division 1. This person married twice. The first wife had a very fine set of teeth, her father had fine and regular teeth. The second wife has very regular

III. 3

III. 4

IV. 6

IV. 8

IV. 7

IV. 5

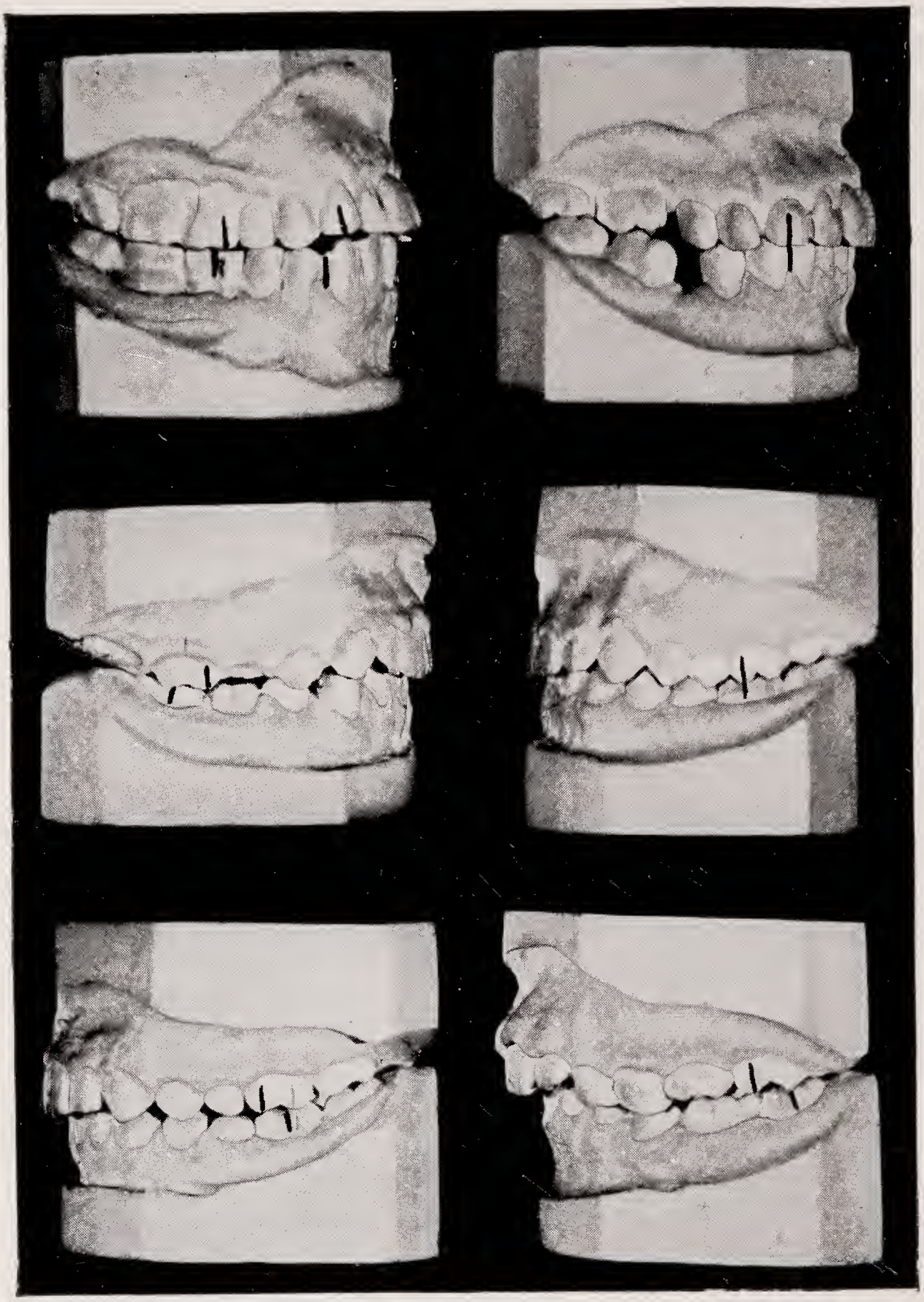


Fig. 18.

teeth (Fig. 18, III, 4). She belongs to a family of six of whom five have or had dentures practically anatomically correct. The father and mother of this family had well-developed jaws, and the teeth which remained were in regular arrangement.

Of each of these marriages of III **3**, there are four children.

Generation IV. The first marriage of III **3**, No. **1**, is a case of Class II bilateral, neither division 1 nor division 2; the upper incisors have a normal inclination. Nos. **2**, **3** and **4**, have regular teeth almost ideal. None of these had adenoids.

The second marriage of III **3**, Fig. 18, shows above and on the left again the model of the father's mouth and, on the right, that of the mother's (III **4**).

IV **5** is a case of Class II, neither division 1 nor division 2. This case is very like IV **1**, child of the first marriage. Operation for adenoids. IV **6** and **7** are cases of Class II, neither divisions 1 nor 2. IV **8** has an anatomically correct occlusion. None of the children **6**, **7** and **8** have had adenoids.

Diagrams of almost all these persons have been reproduced in Rubbrecht's work. Those cases of Class II of whom diagrams were made are all, except one, cases of inferior retrusion with a normal maxilla ; there is one case alone of superior protrusion with a normal mandible.

Fig. 19 shows the dentures of six persons.

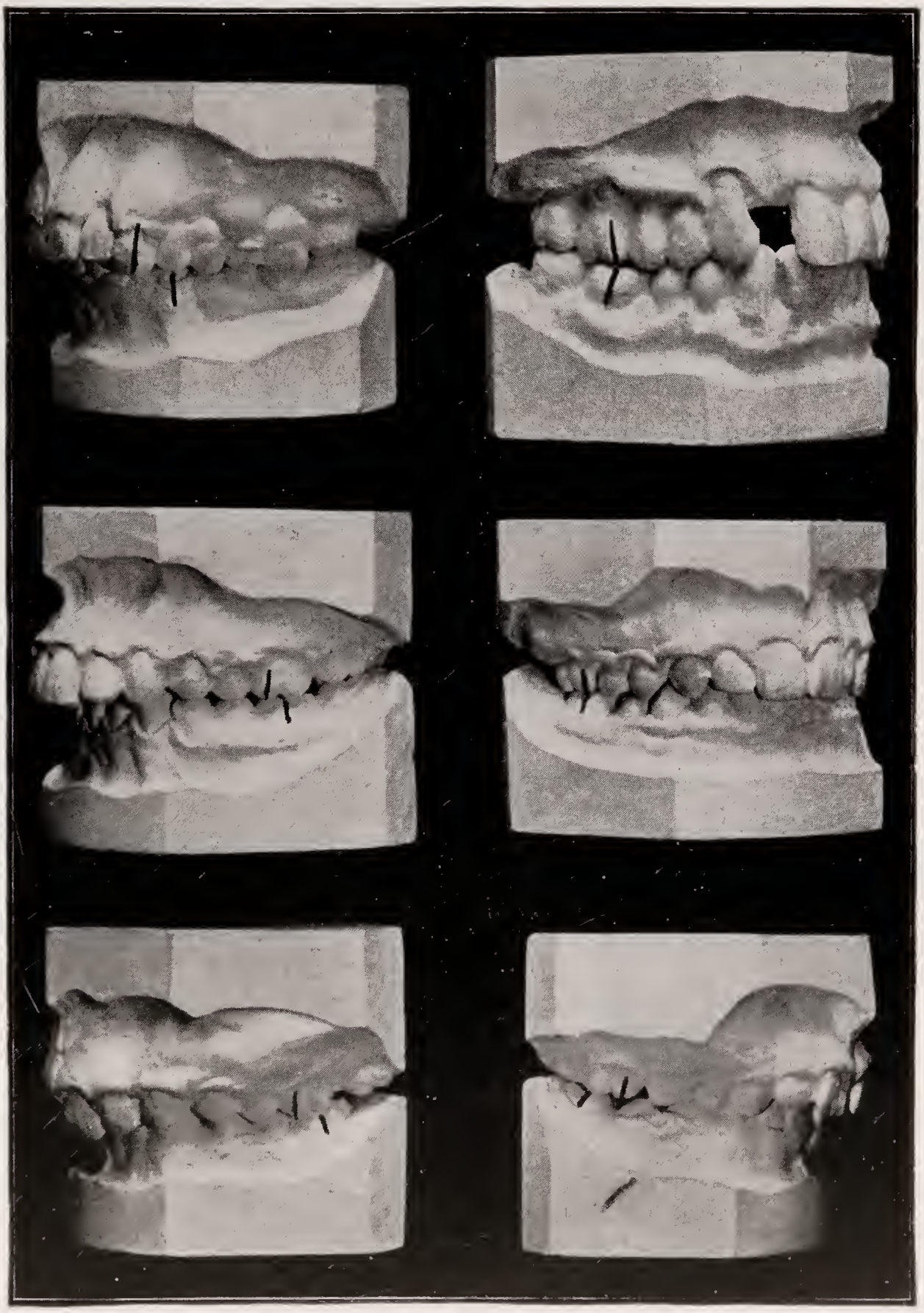


Fig. 19.

III **6** is the first cousin of III **3**. The diagram is published in Rubbrecht's work. The infradental like that of the cousin (Fig. 16) is 5 mm. posterior to the normal. This is an accentuated case of inferior retrusion. In this family there are, together with two cases of normal occlusion III, **7** and IV, **13**, a case of Class II, divison 1 (IV, **9**) and Class II division 2 (IV, **10**), and two cases of Class II in which the upper arch is approximately normal (III, **6** and IV Figs. II **11**). The two upper models are the parents and the four below the children.

IV, **9** has never had adenoids ; inferior retrusion.

IV, **10** had adenoids ; pronounced inferior retrusion.

IV, **11** no adenoids ; Class II, but neither division 1 nor 2.

IV, **13** has an occlusion anatomically correct.

Figs. 17, 18, 19 show three cases of inferior retrusion in four persons of the third generation : sister, brother, first cousin ; and, in thirteen persons of the fourth generation, seven cases of Class II : brothers, sisters, cousins or second cousins. In the fourth generation, inferior retrusion is present in one of the parents of all the members, while in the other parent there is an almost anatomically correct denture. The proportion of cases of Class II exceeds 50 per cent for all the families of the third and fourth generations.

The chance occurrence of three marriages in the third generation of persons with inferior retrusion to persons with regular sets of teeth, offers conditions which are extremely favourable for the evidence of the prospective part which heredity plays in the ætiology of postnormal occlusion. If it were possible to make an experiment in this sphere, it would be difficult to find a more favourable concatenation of conditions.

Anterior Superior Hypergnathy

Figure 20 shows models B and C of two second cousins, both with anterior and superior hypergnathy ; the teeth also are of the same type, which is of an unusual kind.

As the common ancestor from whom this type is undoubtedly descended is a great grandparent, we are in the presence of the transmission of a character with minimal variations extending over a century. A is the father of B, and has the same shape of teeth, but the occlusion is Class II, while that of the son is Class I.

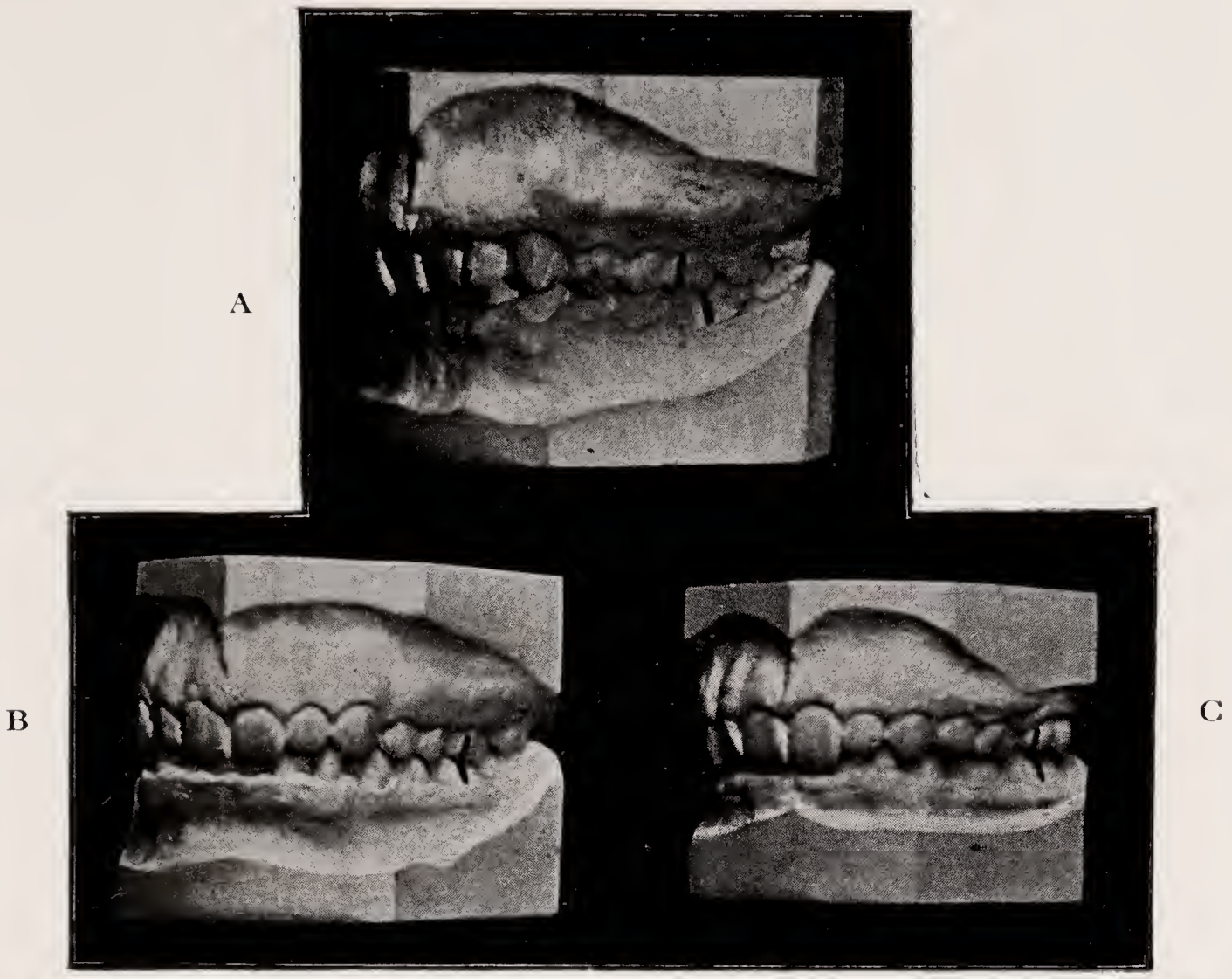


Fig. 20.

In Conclusion

1. Inferior protrusion and superior retrusion are due only exceptionally to a local cause and are as a rule dependent upon heredity.

2. Inferior protrusion and superior retrusion are as a rule manifestations of an idiovariation consisting in the fact that the growth of the maxillæ anteriorly is retarded in the course of evolution, and remains behind in relation to the development of the mandible in a sagittal direction.

3. Inferior retrusion and superior protrusion are as a rule manifestations of an idiovariation consisting in the fact that the growth in length of the mandible is retarded in the course of evolution, and remains behind in relation to the development anteriorly of the maxillæ.

4. The type of occlusion is influenced to a great extent by heredity.

5. Anterior superior hypergnathy is hereditary. The cases of Class II which occur sometimes in this variation are little influenced by heredity.

Dr. Rubbrecht points out that since his article appeared, there has been published a remarkable work by Reinhold Ritter* at the

* Ritter, R. 1937. "Ueber die Frage der Vererbung von Anomalien der Kiefer und Zähne." Leipzig, H. Meusser.

Dental Institute of the Univeristy of Breslau, showing the results of experiments in canine heredity of crossing a sheepdog of long pedigree with a bulldog bitch of equal pedigree, producing ten descendants. One of these showed on the left antero-occlusion of the lower incisors, this one was crossed with a bull dog of long pedigree. Of the nine descendants, one had a denture of a bull-dog, one a denture of a sheepdog, two had incisors edge to edge, and five had dentures of a type between the two extremes.

The question of heredity of inferior protrusion has been studied in twins. When this work of Rubbrecht's appeared, the statistics published by H. W. Siemens, Hunold, Riepenhausen, M. Kösters and Präger comprised altogether four pairs of identical twins and six pairs of bi-ovular twins of whom one at least had mesial occlusion. Amongst the four cases of uni-ovular twins, two were identical and two were dissimilar. These and other observations by Ch. R. Baker, G. Korkhaus, R. Ritter, establish for their part that heredity plays a predominant part in the origin of inferior protrusion or superior retrusion.

The research carried out by R. Richter and those on twins have confirmed Rubbrecht's observations and conclusions on heredity of inferior protrusion and superior retrusion.

R. Richter found no case analogous to a Class II among dogs, and therefore could not experiment in this anatomical variation.

The observations of this author on 96 pairs of uni-ovular twins, 126 pairs of bi-ovular twins, and one case of quadruplets, gave the following results : 6 pairs of uni-ovular twins had a distocclusion bilaterally, one pair had on the right a distocclusion and on the left a cusp to cusp occlusion. In another pair there was an edge to edge occlusion on the left, while in another pair a twin had a distocclusion bilaterally and the other, on one side a distocclusion and on the other side a cusp to cusp occlusion. Two pairs only of uni-ovular twins showed a dissimilarity from the point of view of distocclusion.

Among the bi-ovular twins, one pair only were alike, twelve pairs were dissimilar.

Discussion

Mr. G. Northcroft thanked Mrs. Lindsay very much for her industry in translating Dr. Rubbrecht's paper. He thought the diagrams were a little difficult to understand at a casual glance and they required studying, so he could not make any comments on them at the moment. He would like to ask Mrs. Lindsay whether she considered Dr. Rubbrecht had established the point that superior protrusion or post-normal occlusion was definitely hereditary.

Mr. F. Bocquet Bull asked whether, supposing his great-grandfather had had superior protrusion and he himself had superior protrusion, Mrs. Lindsay would call that a case of heredity. He could not see why it should not be just a singular incident in his great-grandfather's make-up and a singular incident in his own ; it need not be that he inherited it from his great-grandfather ; it might just happen to them both.

The President said he would like to join with Mr. Northcroft in thanking Mrs. Lindsay for the painstaking way in which she had translated Dr. Rubbrecht's paper. He hoped that for many years to come Mrs. Lindsay would be able to give the Society her annual paper on foreign orthodontic literature. He regarded the meeting at which

Mrs. Lindsay gave her excellent résumé of what foreign orthodontists were doing as one of the most interesting meetings that the Society held.

Mr. H. Chapman said that when there was some small protrusion of the mandible there was very likely to be also some retardation of the maxilla, because obviously the upper teeth must go back a little, and that might account, in cases of small degree, for the apparent discrepancy. There might not be an actual retardation but a holding back of the upper incisors on account of the position of the lower incisors.

Mr. N. J. Ainsworth said he had been a little handicapped in understanding Mrs. Lindsay's summing-up by not knowing what was the meaning of the word "idio-variation." Would Mrs. Lindsay explain what that word meant ?

Mrs. Lindsay, in replying to the discussion, said that inferior retrusion and superior protrusion were manifestations of an idio-variation due to a retardation of the growth forwards of the mandible. In one of the cases she had shown the whole of the mandible was carried back, and there was a very low dental area ; it was really a defect in the angle of the jaw. She thought that what Dr. Rubbrecht meant by "idio-variation" was "individual variation"—one of the effects of passing on individual characteristics. Dr. Rubbrecht had very many genealogical trees, showing one characteristic appearing again and again in a family, even, as she had pointed out, in four generations, so that it seemed impossible to say that it was not hereditary. One case she had shown, which seemed to her a very interesting one, was the son of a Class III case and the father of a Class III case, and yet he appeared to be a Class I case until his diagram was plotted. Dr. Rubbrecht's method of measuring was a very interesting one and he claimed that it was much more easy than any of the other methods. She would describe it in her paper when the paper was published, but she thought it was too complicated to describe that evening. Replying to Mr. Northcroft, she thought it was sufficiently established that postnormal occlusion was hereditary, but, as Dr. Rubbrecht pointed out, one must be careful to take the measurements in the sagittal direction. Referring again to the case which appeared to be a Class I case, it did not seem to be a case of hereditary prenormal occlusion, but when one saw that the prosthion was distal to normal one realised that it was not a real Class I case. Dr. Rubbrecht's contention was that the teeth did not show the condition of the jaws until the whole face was plotted out. With regard to Mr. Chapman's remarks, when she was preparing the paper she thought very much about the first molars and how they were really the keystone of the arch, and she would say that the second temporary molars were also very important from the point of view of the occlusion. Dr. Rubbrecht said that in a child of $3\frac{1}{2}$ years it depended on the way the molars occluded whether the jaw was held back or could come forward. If they came into the right occlusion when they erupted, then they were held like that, if they were in prenormal occlusion they would be held in that position, and if they were in postnormal occlusion they would be held in that position. Dr. Schwartz had written a very valuable work on the adjustment of the six-year molars behind the temporary dentition ; it had taught her a great deal about the way in which the first molars occluded. If they happened to be in the right direction as they slid in they would occlude rightly, but if they were a little forwards they would slide forward and there would be a prenormal occlusion.

The President, on behalf of the Society, thanked Mr. Ainsworth for his Short Communication and Mrs. Lindsay for her paper, and he also thanked all those who had taken part in the discussion thereon,

A Case of Open Bite in the Molar Region with Absence of all Premolar Teeth*

By Lilah Clinch, L.D.S.I.

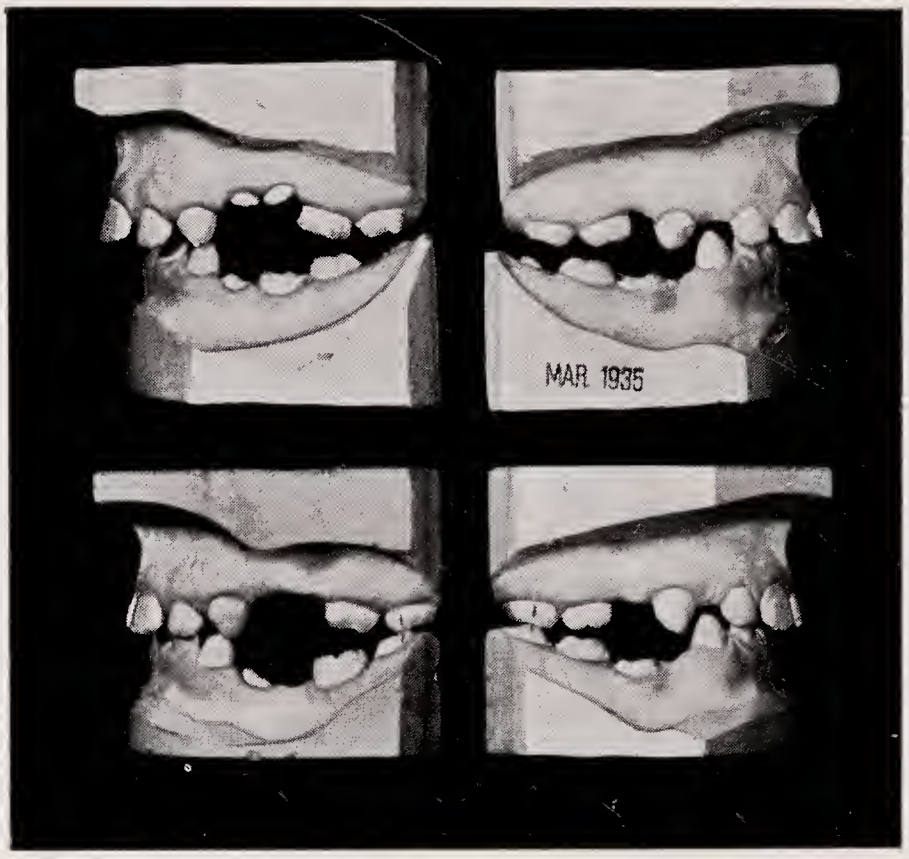


Fig. I.

THE upper models (Fig. I) show the case before treatment. The space between the upper and lower first and second permanent molars can be seen, and the lower incisors are biting on the palate. I saw the patient for the first time when she was aged 14 years 1 month. According to the history she had always been a slow eater but had suffered no ill health or even inconvenience from her lack of occlusion. She had lived in Constantinople until she was eight years old and at about that time she had a slight enlargement of the thyroid gland which had disappeared without treatment in about a year.

* Read before the Society, December, 1937.

Fig. I shows that there were two teeth on the upper left side which looked as if they might be partly erupted premolars. On the right side there was no sign of premolars, and the canine had moved distally. On the lower left side there were two teeth which looked like partly erupted deciduous molars and on the lower right there was a second deciduous molar. However, the X-rays showed an absence of all premolar teeth and of the upper and lower third permanent molars. The roots of the deciduous molars were almost completely absorbed.

I decided to attempt to improve the molar occlusion, and at least to improve the form of the upper arch so that a satisfactory restoration could be made. The patient wore intermaxillary traction, with a spring on the lower arch to depress the incisors, for twelve months. This improved her appearance very much, and her occlusion very little. She then wore the lower appliance with the spring to depress the incisors and an upper lingual arch, with a spring to move the upper right canine medially, for another twelve months, and the result is shown in the lower models (Fig. I). The antero-posterior relationship of the mandible and maxilla has improved and there is occlusion of the second permanent molars and I do think that the altered relationship of the jaws has helped these teeth to occlude apart from their further eruption during the two years of treatment.

But the first permanent molars are as far apart as ever (there may be a slight improvement on the right side, but it is very slight). And the upper right canine has moved only 2 mms. nearer to the lateral incisor.

In Fig. II the difference in form of the upper arch after the intermaxillary traction can be seen. The upper and lower deciduous molars fell out during the course of the treatment except for one on

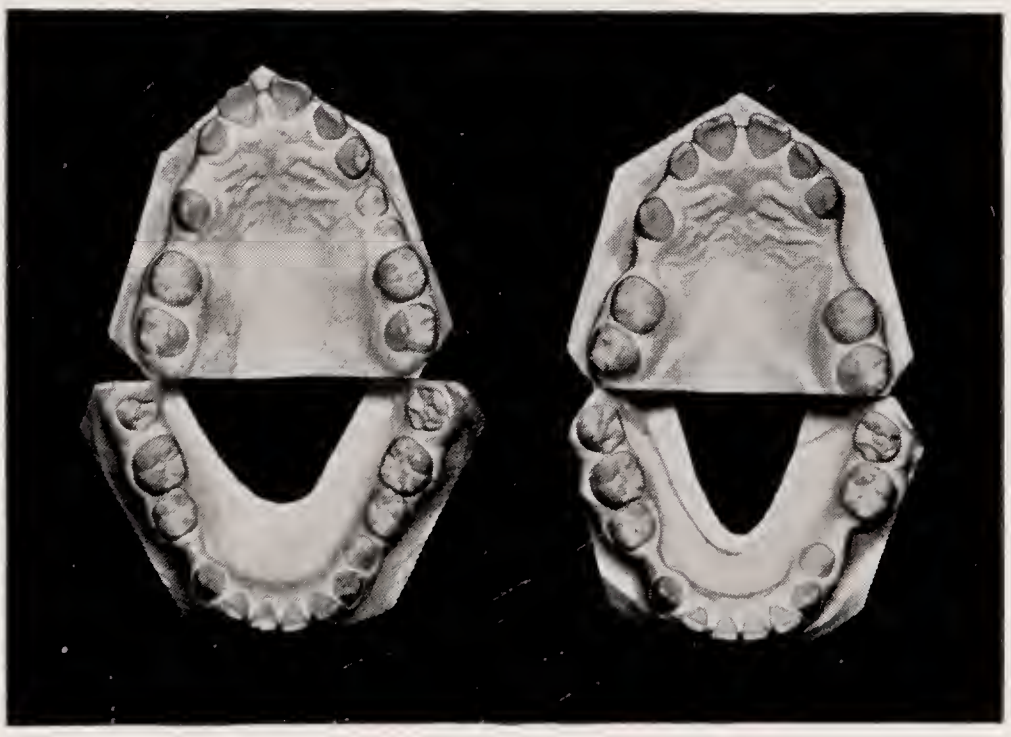


Fig. II.

the lower left. I would be very grateful if someone would tell me how I can improve this case or what treatment if any I should have carried out in the past two years. Perhaps it is one of those cases of unjustifiable optimism of which Mr. Russell Marsh has spoken. The patient is now sixteen and declares that her mastication has improved greatly, which is either due to the occlusion of the second permanent molars or to imagination.

Discussion.

Mr. George Northcroft said that at the age of 16 it seemed to him very unlikely that the first permanent molars would ever erupt into occlusion. A possible treatment would be to leave spaces of the premolars for the present, and the first permanent molars could be shod with gold inlays bringing those teeth into occlusion.

Miss K. C. Smyth recalled the case reported to the Society in November, 1936 by Mr. Bane.

Mrs. Lindsay said that it was the absence of the premolars which accounted for the lack of bone in that region, also the shape of the canines. Conical teeth were typical of a good many cases where the permanent teeth were missing.

Mr. Watkin said that the remarks of the last two speakers had reminded him of another observation, namely that the tongue got between the posterior teeth and caused the open-bite there. If both arches were extended so as to give plenty of room for the tongue, then the teeth erupted as they ought to do. That, of course, did not quite fit the present case, because here the premolars were missing.

The President said that with regard to Mrs. Lindsay's remark that the absence of the premolars might have caused the open bite, he was inclined to doubt very much whether that had happened. If one removed the first molar on one side, or, indeed, both molars on one side, and not on the other, he at least had never been able to distinguish any influence on the growth of the bones at all. He did not think that the mere absence of teeth from the bone had any effect on the growth of the bone itself.

Mr. Headridge said that he had had two cases similar to the one brought forward by Miss Clinch. In one of them he could not find any reason for the open-bite at the back, but he happened to notice that while the child was sitting in the chair she had a bad habit of sucking her cheek between the teeth, and her mother told him that she even did that while asleep.

Miss Clinch, in reply, thanked Mr. Northcroft for his suggestion of inlays on the molar teeth. As to the absence of the premolars causing the lack of growth, she was afraid that had not occurred to her. She assumed that what had caused the absence of the teeth had also caused the open-bite, but she had no idea what that was. The tongue was not abnormally large, and as far as she could see there were no habits at all which might have had some bearing on the matter.

The Treatment of a Case of Inferior Protrusion with Deficient Development of the Premaxillary Region *

By K. C. Smyth, L.D.S.Eng.

THE patient was aged 13 years, 4 months when first seen. She was slightly short and small for her age : height 4ft. 8in., weight 5st. 13lbs., but strong and healthy. She has not grown very much in height during the four years since her first visit, but her face has changed and developed a good deal, as will be seen later. Her father has a very prominent mandible.

The original condition of occlusion is shown in Fig. I. The flattening of the premaxilla is very marked, while the arch relationship as indicated by molar occlusion gives hardly any evidence of prenormality. The length of the mandible, however, and the obtuseness of the angle, appear to be somewhat characteristic of a true prenormal case. The treatment for the first eighteen months was confined entirely to forward movement of the maxillary incisors, which moved very slowly. There were several set-backs due to breakages in the early stages, and fifteen months after the start, the patient could bite either just over the lower incisors, or behind them, and the habit of biting forward with the mandible was difficult to overcome. The condition remained about the same for some months, and at the end of eighteen months I decided that something must be done to reduce the lower arch, and the right mandibular central incisor was extracted in October, 1935.

From this point treatment in the upper jaw was stopped, and no appliance has been worn since. There has been no sign of relapse. A lower appliance was used to retract the mandibular incisors and canines, and a little grinding of the incisal edges was done to assist the readjustment of occlusion. In June, 1936, the lower teeth were clear of the uppers, except for an edge-to-edge bite of the upper left lateral incisor on the lower canine. The lower right lateral incisor had dropped too far lingually, and had to be moved forward into the arch.

The patient left school in January, 1937, when I took a second photograph. She was then 16 years, 7 months, and the change in her appearance was very marked. She had been aware of her unusual appearance before, and adopted a defensive attitude about it. All that has changed, and her face and eyes have a different expression. (Fig. II.) Since January, I had heard nothing of the patient (who was always a difficult child to arrange visits for), until

* Read before the Society, December, 1937.

Fig. I.

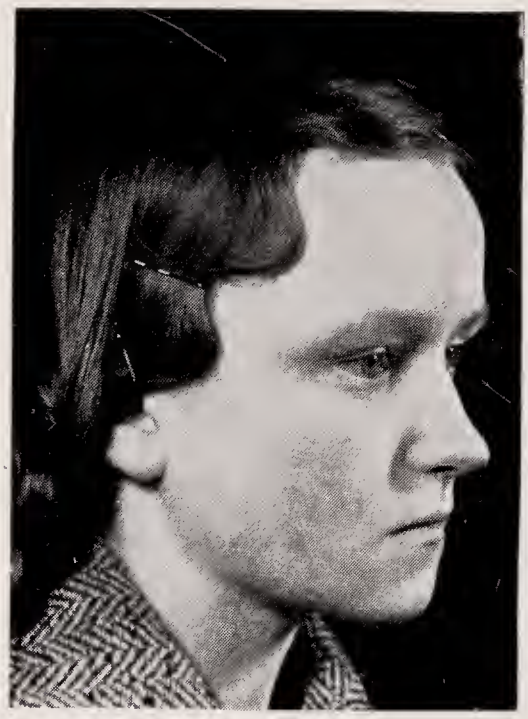


Fig. II.

October last. I then heard from her dental surgeon in Carlisle that she had come to him saying she was going abroad in a week's time, and would be away two years. She had left out her retention plate for an indefinite time past. He was afraid that the occlusion was undergoing some change. He took models for me, and the changes can be seen (Fig. III). There has been a slipping forward of all the lower cheek teeth, and the molar occlusion is now definitely prenormal. It is difficult to imagine that all the change in relationship is due to shifting of the teeth towards the space of the extracted incisor, especially when it is remembered that a good deal of that space must have been obliterated by the retraction of the other front teeth. The lower third molars are showing signs of erupting —the right one has appeared, and the space which originally existed between the first and second molars has been obliterated. It was impossible to carry out any treatment in any case, as patient was just going abroad, and I shall not see her for at least two years.

Fig. III.

Shall I then find that the front of the lower arch has been pushed completely outside the upper? Or will the lower front teeth have "collapsed," and become imbricated? Would the extraction of the third molars prevent any of these changes occurring? I hope that some of these questions will be answered in due course.

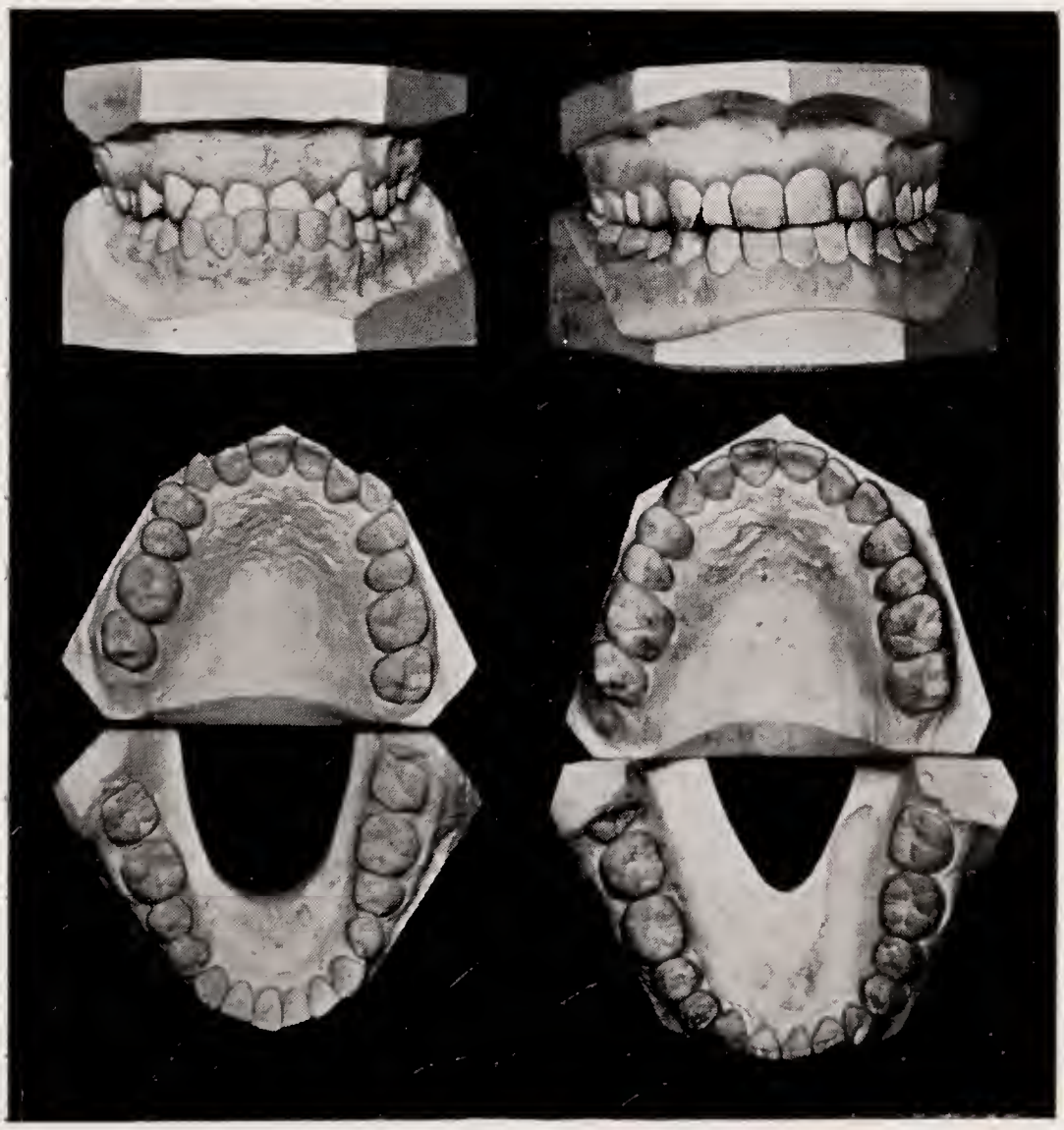


Fig. IV.

Fig. IV shows the changes in the shapes of the arches, and demonstrates, I think, the nice alignment of the lower incisors, nine months after removal of appliances. The left canine would never quite fit into the arch, and I fear that pressure from the back of the mouth will increase its imbrication. The development of the bone around the roots of the maxillary incisors is also shown, and its effect can be seen in the photograph. I should be grateful for criticisms and suggestions about this case.

Discussion

Mr. Harold Chapman said that Miss Smyth had brought forward an extremely interesting case. He was not quite sure whether he would have diagnosed it as Class III, but it was difficult to judge from the models. It did exemplify the difficulty of treating these conditions when the child had reached the age of 14. It would have been much simpler if the child had been ten or even twelve perhaps. He was surprised to see such a good result from the removal of the lower incisor in this case, but whether most of the good work had been done before that tooth was taken out he would not like to say. It rather went to confirm the view that it was probably not a true Class III case. He had been particularly interested in the title of Miss Smyth's Communication: "... with Deficient Development of the Premaxillary Region." That was an expression which was very commonly used, but he could not conceive quite how the premaxillary region could be deficient, unless there was a deficiency also of the maxillary region. If the one region was small the other was bound to be small too. He could not see the smallness of the premaxillary region without finding a corresponding smallness of the maxilla, certainly in the region where they articulated. This case would never have made him think of smallness of the premaxillary region. Still, the result was satisfactory and he congratulated Miss Smyth upon it, and that was the thing that mattered, not the theoretical point.

Mr. Watkin asked whether Miss Smyth had attempted to make a root movement of the upper incisor.

Mrs. Lindsay said that there was a recent paper in the *Journal of Anatomy* which she would recommend for Mr. Chapman's perusal: "The Narial Margins in Man."

Mr. George Northcroft said that even if the upper molars did not actually touch the gum, it might get very tender, and it was extremely likely that to ease that tenderness, the child started going back to the old occlusion. He congratulated Miss Smyth on having diagnosed the case as a lack of development of the premaxillary region, because it was so obvious that that was what it was. One had only to look at the child's profile, pinched in at the base of the nose, and showing there a very marked lack of development to be sure of that. He drew attention to the way in which the bridge of the nose of a child straightened as the profile developed.

The President said that looking at the photograph he did not quite agree that it was the premaxillary part which was undeveloped. He thought it was the whole of the maxilla. Sir Frank Colyer had spoken of this in one of the editions of his book. He said that the face looked as if someone ought to take a pair of bellows and blow up each nostril.

Miss Smyth, in reply, said with regard to the question of deficient development in the premaxillary region, she had wondered whether this was due to her lack of understanding of what Mr. Chapman had said. It seemed obvious that the posterior part of the maxilla could be normal and the front part of the arch and the premaxilla undeveloped. She had never questioned that the premaxilla was the part mainly at

fault in this case. She had been interested in the suggestion with regard to the extraction of the third molars and that was what she would like to have done if there had been time. She agreed that that would probably save further trouble in some respects.

An Ordinary Meeting of the Society was held at Manson House, 26, Portland Place, London, W.1., on Monday, January 11th, 1937, at 8 p.m. The President, Mr. F. St. J. Steadman, occupied the chair.

The minutes of the Annual General Meeting, held on December 7th, 1936, were read and they were confirmed and signed.

Mr. H. Richards, a newly elected member, was introduced to the President.

The following candidates for membership were elected members of the Society: Mr. F. E. Gillieron, H.D.D., L.D.S.Ed., 6, Hartington Place, Carlisle; Mr. W. Russell Logan, L.R.C.P. & S., L.D.S.Ed., 1, George Square, Edinburgh, and Mr. W. E. Morton, L.D.S.Eng., 35, Devonshire Place, W.1.

A short communication entitled, "The Six Year Old Molar," was read by Mr. L. R. Marsh.

The President then delivered his presidential address, "Malocclusion in the Tasmanian Aborigines."

Mr. S. A. Riddett, in proposing a very hearty vote of thanks to the President for his address, said he was sure everyone present would agree that it had been a most fascinating one. He had listened to a good many presidential addresses, but the one which had just been delivered was certainly the most interesting and enthralling that he had ever heard. The President's many activities were well known to all the members, and it was a marvel to him how Mr. Steadman had been able to find time to devote all the care and attention to his address that he had given to it, and to prepare the beautiful slides which had been thrown on the screen in such large numbers, every one beautifully clear, and in great detail, in view of all his other activities, which included playing chess for Surrey. He thought the members of the Society should congratulate themselves on the fact that they had in Mr. Steadman a president who would conduct himself with grace and honour during the coming year.

The vote of thanks was accorded with acclamation.

The President thanked Mr. Riddett for his very kind remarks and the members for the way in which they had received the proposition and the meeting then terminated.

A meeting of the Society was held at Manson House, Portland Place, W., on February 1st, 1937. Mr. F. St. J. Steadman, President, was in the chair.

The President proposed the election of Dr. J. Sim Wallace as an honorary member of the Society. He said that the name of Sim Wallace was a household word with orthodontists and when he resigned from the Society owing to ill health and inability to attend the meetings the Council felt that the least that could be done was to propose him as an Honorary Member. He proposed accordingly.

The proposal was agreed to with applause.

The following candidate for election was also declared elected by unanimous vote: Kenneth Hooper, M.R.C.S., L.D.S., 8, Copers Cope Road, Beckenham.

Dr. E. S. Friel read a casual communication on the "Growth and Position of the Rugæ" and Mr. H. Chapman his paper on "Classification, Prognosis and Treatment."

An Ordinary Meeting of the Society was held at Manson House, 26, Portland Place, W.1, on Monday, March 1st, 1937, at 8 p.m. The President, Mr. F. St. J. Steadman, occupied the chair.

A short communication entitled, "Models of the Mouths of Triplets, Aged Four Years, Six Months," was then read by Mr. S. B. Newton and followed by a paper on "Cleft Lip and Palate—Surgical and Dental Aspects of Treatment," by Mr. H. Pomfret Kilner.

An Ordinary Meeting of the Society was held at Manson House, 26 Portland Place, W.1, on Monday, May 3rd, at 8 p.m.

The following demonstrations were given :—

Dr. G. Northcroft : "Prosopometers Past and Present."

Mr. J. B. Parfitt : "The Camera Lucida."

Mr. K. E. Pringle : "Results of Early Extractions."

Mr. R. E. Rix : "The Construction of Stainless Steel Bows without Soldering or Welding."

Mr. H. G. Watkin : "Adaption of Stainless Steel Appliances for Efficient Welding."

The following motion, passed by the Council, is submitted for the approval of members :—

Motion by Mr. Cutler—

"That a prize in the form of orthodontic books or instruments not exceeding five pounds in value, be awarded annually for the best communication or short paper submitted to the Society, by a member whose professional qualification is of less than four years' standing. The judges for the award to be a sub-committee of the Council to which one Ordinary Member be co-opted, and vested with discretionary powers regarding the reading and publication of any material submitted and of withholding the award entirely if a sufficient standard of merit is not attained. The material to be submitted not later than the date of the October Meeting to allow the inclusion of the prize-winning paper in the programme for the ensuing year."

An Ordinary Meeting of the Society was held at Manson House, 26, Portland Place, W.1, on Monday, October 4th, 1937, at 8 p.m. The President, Mr. F. St. J. Steadman, occupied the chair.

The following candidates for election, who had been declared eligible by the Council, were elected as members of the Society by a show of hands : E. H. T. Nash, M.R.C.S., L.R.C.P., D.P.H., Public Health Offices, Bath Road, Hounslow ; J. E. Inman, L.D.S.Eng., Beechcroft, Wokingham, Berks, and J. S. F. Horton, L.D.S.Eng., 46, Ridgeway, Hayes, Kent.

A short communication entitled, "Some Cases of Defective Development in the Deciduous Dentition," was read by Mr. H. C. Apperley, and then Mr. H. Chapman and Mr. L. R. Marsh opened a discussion on "Failures in Orthodontic Practice."

An Ordinary Meeting of the Society was held at Manson House, 26, Portland Place, London, W.1, on Monday, November 1st, 1937, at 8 p.m. The President, Mr. F. St. J. Steadman, occupied the chair.

The following new member was introduced to the President : Dr. E. H. T. Nash.

The following candidate, who had been declared by the council eligible for Corresponding Membership of the Society, was elected by show of hands : A. S. Ghosh, M.B.Cal., L.D.S.Eng., Simla East, Punjab, India.

A short communication entitled, "A Case of Unintentional Movement of the Tooth in an Adult," was read by Mr. N. J. Ainsworth; and a paper, "Dr. Rubbiecht's Studies on Sagittal Maxillo-Facial Variations and Heredity," was read by Mrs. L. Lindsay.

ANNUAL GENERAL MEETING.

THE annual general meeting of the Society was held at Manson House, 26, Portland Place, W.1, on Monday, December 6th, 1937. Mr. F. St. J. Steadman, President, was in the chair.

Election of Officers and Councillors.—The PRESIDENT reported that no counter-nominations of officers and councillors had been received, and those nominated by the Council were declared elected.

OFFICERS AND COUNCILLORS :—

President	Mrs. L. LINDSAY.
Immediate Past-President ...	Mr. F. ST. J. STEADMAN.
Vice-Presidents (in order of seniority) ...	Mr. H. C. VISICK. Mr. S. A. RIDDETT. Mr. C. S. MORRIS.
Secretary	Mr. R. CUTLER.
Treasurer	Mr. H. R. EVANS.
Curator	Mr. L. R. MARSH.
Librarian	Miss K. C. SMYTH.
Editor	Mr. R. E. RIX.
Councillors	Mr. A. L. PACKHAM. Mr. T. JOHNSON. Mr. W. CHARLES (with charge of programme arrangements.)

Election of Auditors.—On the motion of Mr. HAROLD CHAPMAN, seconded by Mrs. LINDSAY, Mr. Buckley Sharp was elected an auditor, and on the further motion of Mr. ROBERT CUTLER, seconded by Mr. GEORGE NORTHCROFT, Mr. Gordon Taylor was elected second auditor.

HON. TREASURER'S REPORT.

The subscriptions during the past year have amounted to £275 11*s.* 6*d.*, an increase of £14 12*s.* 6*d.* on the previous year. The interest received from investments remains at £6 19*s.* 0*d.*, making the total income for the year £282 10*s.* 6*d.*, as compared with £268 19*s.* 0*d.* last year.

The expenditure for the year has amounted to £183 16*s.* 1*d.*, which is £92 0*s.* 4*d.* less than the previous year when the expenditure was rather above the average. There is therefore a credit balance of £98 14*s.* 5*d.* on the year's working.

The Society's assets are as follows : 500 National Savings Certificates at a present value of £605 16*s.* 8*d.*; 2½ per cent. Consolidated Stock, purchase value, £250; cash on deposit, £10; cash at bank and in hand, £203 17*s.* 2*d.*, making a total of £1,069 13*s.* 10*d.*, as against £945 2*s.* 4½*d.* last year.

Mr. HAROLD CHAPMAN proposed the adoption of the report, and this was agreed to.

Mr. NORTHCROFT asked whether the Savings Certificates were being reinvested when their period expired, and the PRESIDENT replied that that was being done.

Mr. SAMUELS asked whether, in view of the accumulation of capital,

the Council would give consideration to the lowering of the Society's subscription.

The PRESIDENT replied that he did not think the lowering of the subscription could be considered. It was only a modest guinea as compared with the three guineas for the British Dental Association.

HON. SECRETARY'S REPORT, 1937.

During 1937 the usual programme has been carried through, seven meetings being held, the communications and papers being of practical interest and scientific value. During the year, negotiations have been started to secure adequate accommodation for a private library and museum at the headquarters of the British Dental Association, and it is my pleasure to inform you that these negotiations are about to reach a successful conclusion.

Examination of the membership at the commencement of the year showed a total strength of 271, this comprising 161 London, 91 provincial, 6 honorary and 13 corresponding members. During the year the loss to the Register has been two members deceased, 8 resignations and 3 removals, making a total of 13, whilst 10 new members have been elected. The total membership is thus 268 and in this connection it should be noticed that there has been a further decline in the average attendance, but it is hoped that continued and fresh support from the members will prevent a recurrence of this in the forthcoming year.

On the motion of Mr. WATKINS this was adopted.

HON. LIBRARIAN'S REPORT.

The policy of the Library has been under discussion by the Council during the year, and as a result, a room has been taken, for a term of three years, for use as the Library and Museum of the B.S.S.O. It is situated on the top floor of 13, Hill Street, B.D.A. Headquarters, and will be available for the use of members during the ordinary working hours (9.30 to 5.30 from Monday to Friday, and 9.30 to 12.30 on Saturday). The room is now being equipped, and it is hoped that it will be ready for use in March, 1938. A further statement upon this matter will be made later, and circulated to members, by the Hon. Librarian.

Mrs. LINDSAY proposed that it be adopted.

Mr. NORTHCROFT asked whether the bookshelves at Hill Street would be kept locked. It seemed possible that if free access were granted to all and sundry, apart from the casual oversight of a caretaker, volumes might be missing. He agreed that modern magazines might be freely available to everybody, but valuable books should not be left unguarded.

The PRESIDENT said that the details had not yet been worked out, but Mr. Northcroft's suggestion would be borne in mind.

The report was adopted.

The PRESIDENT said that the Curator was not able to be present to give his report.

Mr. HAROLD CHAPMAN suggested that a collection should be made of serial models of both normal and abnormal cases. If such serial models were collected they would be of far more value than anything at present in the Society's museum. It took a long time to collect these things.

Motions Proposed by the Council.

The Secretary read the following motion which was recommended by the Council :—

> "That the Ordinary Meetings of the Society shall be held in the months of January, March, May, October, November and December in the evenings of such days, and at such an hour as the Council may from time to time determine."

The existing By-law XLI read as follows : "The Ordinary Meetings of the Society shall be held monthly at 8 o'clock on the evening of such days as the Council may determine, except during July, August and September." He said that now, and indeed for many years past, the By-law had not been followed because no meetings had been held in April and June. It was proposed by the Council that the By-law be formulated on the lines suggested in the motion, the February meeting being abandoned in view of its necessary proximity to the date of the January meeting, which must be held late in that month. It had sometimes been a difficult matter to secure both programme material and attendance of members when the January and February meetings were so close together. It was suggested, however, that the March meeting should begin at 7.30 so that there would be more opportunity for business. Under the existing By-law XLI the holding of extra meetings was not precluded, so that if the programme material warranted a meeting in February or at some other time, this could be arranged.

Mrs. Lindsay moved the adoption of the new By-law. She said that it had been proposed by a member who lived in Ireland and who had suggested that the February meeting be abandoned and the March meeting be extended to become, so to speak, a double meeting, but the Council had not seen its way to go quite to that length.

Mr. Rushton, in seconding, said it was a common sense suggestion to have the By-laws in accordance with the usage.

Mr. Northcroft said that he quite agreed that usage should follow the By-laws, but he had taken the liberty of framing an amendment. The motion seemed to imply approval by the Council of a certain slackening of endeavour. His amendment would read :—

> "That there shall be at least six Ordinary Meetings held in any one year, preferably in the months of February, March, May, October, November and December, on such days and at such hours as the Council may from time to time determine."

He could not see why January was chosen for a meeting and February cut out. There was much more continuity if, say, the first Monday in February were allocated to a meeting. If it was deemed advisable in any one year to have an extra meeting, his amendment would cover it because the phrase was used "at least six," and further elasticity was given by the use of the phrase "preferably in the months of." In his view the amendment gave the necessary latitude and at the same time clearly expressed the position.

Mr. Watkin seconded the amendment.

Mr. Harold Chapman said that he was not aware that any inconvenience had arisen from the proximity of the January and February meetings. He felt with Mr. Northcroft that the Council's resolution indicated a slackening of interest. The Society had had seven meetings a year for thirty years, and the membership was twice what it was some years ago. Interest in orthodontics was unabated. He was surprised to learn that there was not sufficient material for papers.

He also thought it would be a convenience to members if the day of the week on which the meeting was held was stated in the motion. He gave notice of a further amendment :—

> "That the Ordinary Meetings of the Society be held on the third Monday in January, and the first Monday in February, March, May, October, November and December, at 8 p.m., unless such day falls upon a Bank Holiday when the meeting should be held on the following Monday."

Miss K. C. SMYTH said that she had been astonished at the regular attendance of the long distance members as compared with the lack of attendance of others who lived close by.

Mr. ROBERT CUTLER pointed out that although there might be an increased interest in orthodontics, this was possibly more than counterbalanced by the decline in the juvenile population.

Mr. VISICK said that he thought it might stir up the members if they had fewer meetings to attend. He supported, however, Mr. Northcroft's amendment because it gave latitude to the Council.

Mr. BULL raised the question as to whether the Annual General Meeting was an "Ordinary Meeting," and after some discussion it was agreed that the word "Ordinary" be left out of Mr. Northcroft's amendment.

With this alteration, Mr. Northcroft's amendment was put and carried.

Mr. CHAPMAN desired to move a further amendment in place of the one of which he had given notice "that the days and hours of the meetings should be stated."

The PRESIDENT asked if this was necessary. The Council would, as a matter of practice, arrange the meetings ahead, and they would be automatically kept to the same days and hours.

Mr. CHAPMAN replied that if they were to be automatically kept to the same days and hours there was no reason for not stating this in the By-laws. He therefore moved :—

> "That the meetings be held on the first Monday of the month, the March meeting to begin at 7.30 p.m. and the other meetings at 8 p.m."

This was seconded from the body of the meeting.

Mr. NORTHCROFT said that this was one of the occasions on which they should trust the Council.

Dr. E. H. T. NASH spoke on the undesirability, from a psychological point of view, of altering the days and hours of meetings. If the meetings of a given body were held on a certain day, members were less likely to miss them.

Mr. Chapman's amendment was lost, 11 voting in favour, and 18 against.

Miss SMYTH suggested a further amendment, that the meetings be held on the first Monday of every month, except under special circumstances.

Mr. TREVOR MATTHEWS asked how many meetings during the last five years had been held on a day other than a Monday.

Mr. CHAPMAN replied that he thought this had never taken place.

Mr. MATTHEWS said that he thought the matter should be left as it was, the Council having sufficient latitude according to Mr. Northcroft's amendment already passed.

Mr. NORTHCROFT's amendment was then adopted as the substantive resolution.

The SECRETARY read the next recommendation of Council as follows :

"That a prize to the value of five pounds (£5) be awarded annually for three years, in the first instance, for the best Communication submitted to the Council not later than September 30th in each year, beginning 1938. The Communication may be submitted by any member whose professional qualification is of not more than five years' standing.

That the Council appoint a Committee of three, consisting of two members of Council and one from the general body of members, holding its first meeting after September 30th in each year.

The Functions of the Committee shall be :—

(*a*) To decide which is the best Communication.

(*b*) To decide which of the Communications shall be read before the Society, the prize-winning paper being one of these.

(*c*) To inform the Council of the decisions not later than November 1st, after its appointment.

(*d*) If none of the papers reaches the standard regarded by the Committee as necessary for the prize, the Committee shall recommend that the award for the year be withheld. Communications not selected for reading before the Society, shall not be included in the *Transactions*, and shall be returned to the authors. Papers must be submitted under a pseudonym, and with the paper there must be a sealed envelope bearing the same pseudonym on the outside, and the author's name and address inside. These must reach the Hon. Secretary not later than September 30th in each year."

Mr. VISICK formally proposed the adoption of the recommendation, and this was seconded by Mr. WATKIN.

Mr. NORTHCROFT said that he could readily understand that the Council might have found it difficult not to approve of such a motion when it was proposed to it, but he differed materially from the Council's point of view. It would be far better to offer £50 or £100 for a piece of research work on a set subject to which all members of the Society might apply themselves, the brilliant young men being just as likely to triumph as the older.

Mr. SAMUELS said that something better ought to be attempted than the present small proposal. He believed that some ten years ago a larger scheme was mooted.

Mr. CHAPMAN said that it was considerably more than ten years ago that a prize of £100 was offered and there were no entries whatsoever. His own view was that the meeting should express its thanks to the Council for bringing this motion before it. Technically it was not necessary to submit it to the Annual General Meeting.

Mr. ROBERT CUTLER said that it was thought that this small prize would not preclude the formulation of any more ambitious scheme such as had been suggested. It brought in a spirit of competition which might stimulate younger men to action. It might give them that added incentive to prepare communications which otherwise would not reach the programme secretary.

Mr. O. BREARS suggested that a bronze medal would be more acceptable than a money prize.

Mrs. MICHÆLIS also urged that a medal be offered, not necessarily to a young member, but to the reader of what was considered by the Council to be the most useful communication made during the year.

Dr. E. H. T. NASH said he had never supposed that the sea of their

calm deliberations would be ruffled by the slightest breeze of acrimony in awarding the prize for the best paper of the year. Certainly it had never been ruffled in other societies of which he was a member. He suggested that a small prize be given to stimulate the effort of the younger members and a larger prize for the best paper of the year. He thought a medal was preferable to a money prize. Such a medal sometimes placed a hallmark on the winner's application for another post. It helped a man considerably to say that he was a medallist for that particular year. It signified that he had either brains or industry or both above his fellows.

The PRESIDENT said that he was willing to accept an amendment that a medal be given instead of £5, but he did not think he could accept another proposal to widen the issue by giving the prize for the best paper of the year.

Mr. SAMUELS then moved that the whole matter be referred back to the Council for reconsideration, and this was agreed to.

The following short communications were read: Miss L. M. Clinch, "A Case of Open Bite in the Molar Region with Absence of all Premolar Teeth"; Mr. W. A. Sowden Hills, "The Problem of the Sequelæ of Removal of Deciduous Molars."; Miss K. C. Smyth, "The Treatment of a Case of Inferior Protrusion with Deficient Development of the Premaxillary Region."

Then followed the President's Valedictory Address and the induction of the President-Elect.

The following candidate for membership was elected: W. A. Sowden Hills, L.D.S.Eng., 11, Barham Road, Croydon.

The business of the meeting then terminated.

BRITISH SOCIETY FOR THE STUDY OF ORTHODONTICS

STATEMENT OF ACCOUNTS, 1936-1937

Receipts. *Dr.*	1935–36. £ s. d.	1936–37. £ s. d.
By Members' Subscriptions	260 19 0	275 11 6
,, Interest on Consolidated Stock and Bank Deposit	6 19 0	6 19 0
Sundry Credits	1 1 0	
	268 19 0	
Debit Balance	6 17 5	
	£275 16 5	£282 10 6

Payments	1935–36. £ s. d.	1936–37. £ s. d.
To Rent	50 0 0	50 0 0
,, Printing & *Transactions*	100 1 6	70 13 9
,, Reporting	21 0 0	25 4 0
,, Refreshments	21 8 0	17 7 0
,, Hire of Electric Standards and Tables	4 2 6	3 12 6
,, Petty Cash	8 10 0	10 0 0
,, Refunded Subscriptions	3 3 0	
,, Bank Debits	1 0	8 4
,, Insurance on Books and Badges ..	15 0	15 0
,, Slides and other Demonstration Expenses	25 14 9	
,, Lantern Attendant	2 5 0	2 5 0
,, Expenses of Empire Meeting Luncheon	38 15 8	
,, The Luncheon for Mr. Kilner ..		1 10 6
,, Removal of Cabinets		2 0 0
		183 16 1
Credit Balance		98 14 5
	£275 16 5	£282 10 6

Assets.

	£ s. d.
500 National Savings Certificates : present value ..	605 16 8
2½ per cent. Consolidated Stock—Purchase Value	250 0 0
Deposit at Bank	10 0 0
Cash at Bank	195 10 5
Cash in Hand : Secretary £4 17 1	
Librarian 1 18 4½	
Editor 5 9½	
Treasurer 1 5 6	8 6 9
Total	£1,069 13 10

We have examined the Books and Vouchers of the Society and certify the above Statement of Accounts to be correct.

T. L. WINN.
K. E. PRINGLE.